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Directorate of Text Books

SCIENCE

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KIRAN GENERAL STORES

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Community Health Cell
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FOREWORD

This text book is prepared as per the syllabus framed based on National policy on Education 1986.The Core Elements and Human values that are stressed in the National policy on education are addressed at length in developing lessons.

The Directorate is greatful to all those who have participated in the production of this book.

The Text Books are reprinted after editing and making necessary corrections. The Directorate welcomes suggestions for further improvement of the book.

(M. Jalaja Bai)
DIRECTOR
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CONTENTS

		Page No.
1.	Living Things	1
2.	Characteristics of living beings	5
3.	Adaptation of living things to the environment	9
4.	Living beings of the desert	14
5.	Seed and conditions necessary for Germination	19
6.	Human Skeleton	24
7.	Physical Exercises and good postures	28
8.	Our Food	32
9.	Infectious Diseases	42
10.	Soil Erosion and Conservation - Part I	49
11.	Soil Erosion and Conservation - Part II	56
12.	Air and its Uses	58
13.	Environment and pollution	67
14.	Force, Work and Energy	70
15.	Light	84
16.	Shadow and its Parts	87
17.	Natural Resources of the Earth - Part I	95
18.	Natural Resources of the Earth - Part II	98
19.	Natural Resources of the Earth - Part III	103

1. LIVING THINGS

ifferences between plants and animals:

The space around us is the environment. This consists of earth, ater and air. In the environment there are living things and non living ings.

There are two types of living things. What are they? They are ants and animals. The human beings and birds belong to animal roup.

Do this:–

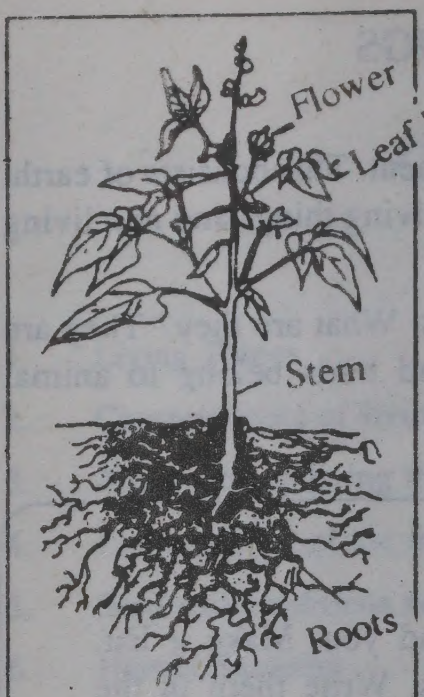
Name the living beings around you. Make a list. Group them in to plants and animals. Write them in the following tabular column.

Animals	Plants

What are the differences between plants and animals? Think over. Observe many plants around you. Though they differ in shapes and sizes, he body parts of them are almost the same.

Do this:–

Pull out a bean plant with its roots from the soil. Observe the parts. Name the main parts.



Bean plant and its parts.

A plant consists of root, stem, branches, leaves, flowers and fruits as its parts. The green leaves, different coloured fruits add beauty to the plants. All these parts are clearly seen in higher plants.

Observe the body of animals. Are the body parts of plants and animals similar? Some animals have two fore limbs and two hind limbs. Some have four legs. Some others have more than four legs. There are animals without legs. But higher animals have the main parts–head, trunk and limbs in their body.

Can you think and tell the main differences between plants and animals? Many parts of plants are green in colour. The green colour is seen wherever the plants are! The leaves are green. Some times other parts are also green. The chlorophyll is present in green parts of plants. Young stem, branches, young flower (flower bud) etc., may be green. Because of the presence of chlorophyll, these are green in colour. The chlorophyll containing parts are tiny factories preparing food in plants. Entire living world depends upon chlorophyll for food. The plants prepare their own food in parts containing chlorophyll using sun light, carbon dioxide, water and mineral salts giving out oxygen. This process is called "Photosynthesis".

Do this: –

Prepare a list of all the food items you use. From which source they have come? Write in front of each food item the plant source or animal source. The animal sources of food comes indirectly from plant sources. How is it so? Can you tell?

All plants depend upon photosynthesis for food. The food of flesh eating (carnivorous) tiger, is the grass eating animal such as deer. The cow that gives milk eats grass.

Animals cannot prepare their own food using simple substances like carbon dioxide, water and mineral salts. The chlorophyll is absent in animals. They depend upon plants for food.

During respiration animals use oxygen from the atmosphere. They give out carbon dioxide. This is going on from birth to death. Carbon dioxide goes to the atmosphere. But the plants use this carbon dioxide and give out oxygen to the atmosphere and purify. So we must be grateful to the plant world. We should plant more and more plants, nurture and protect them.

Majority of animals move from one place to the other. This movement may be for getting food, shelter or adapting to the surrounding environment. Generally the plants do not change their position and move to another place. A coconut tree growing near your house cannot go near the house of another. But a pet animal of your house can go near the residence of another.

Keep in mind:–

The parts of a plant are root, stem, leaf, branches, flower and fruit. The parts of an animal –head, trunk and limbs. The chlorophyll is present in plants. The plant uses water, carbon dioxide and sunlight, prepares food in the presence of chlorophyll, giving out oxygen. This is photosynthesis. Majority of animals move where as most plants do not have this power.

EXERCISES

I. Name the parts of plants that you see around you?

II. What are the body parts of animals?

III. Write the differences between animals and plants.

Fill in the columns below:

Differences between animals and plants

Serial No.	Animals	Plants
1.		
2.		
3.		
4.		
5.		

IV. Lion depends upon plants for food. How far is this statement true?

V. Which part of the plant supports life in all living beings on earth?

VI. What is photosynthesis? What are the advantages from this process to the animals?

VII. What are the advantages of the animals to the plants?

VIII. Complete each of the following sentences using suitable word.

(1) _____ gas is used in photosynthesis.

(2) _____ gas is given out during the preparation of food by the plant.

(3) Majority of the _____ do not move.

(4) The green colour of plant is due to the presence of_____.

(5) The animals pollute the surrounding by giving out _____ gas.

IX. Put a right sign (√) in front of correct sentences and wrong (X) sign in front of wrong sentences in the following.

(1) During respiration in plants oxygen is given out. [ ]

(2) Only when there is sun light the plants prepare food. [ ]

(3) The plants prepare their own food. [ ]

(4) Most of the animals do not move. [ ]

(5) The water is required for photosynthesis. [ ]

(6) When there is sun light oxygen goes out from the plant. [ ]

2. CHARACTERISTICS OF LIVING BEINGS

There are many objects around us. Some of them have life. These are called living beings. The plants, birds and animals are living beings. The rest have no life. They are non living beings.

Do this:–

You see many objects at home, school and on the way. Can you name them? Make a list of them. Among these things which have life? Which do not have life? Group the objects in two groups as shown below. In one group name the living things. In the other group write names of non-living objects.

Living things	Non-living things (Life less objects)

Think and reason out for grouping the objects into living and non-living objects.

Can you live without breathing? Can a living thing lives when kept inside the tight tin just like keeping the eatables? Definitely not. Why? Every living being should respire from birth to death.

Do this:–

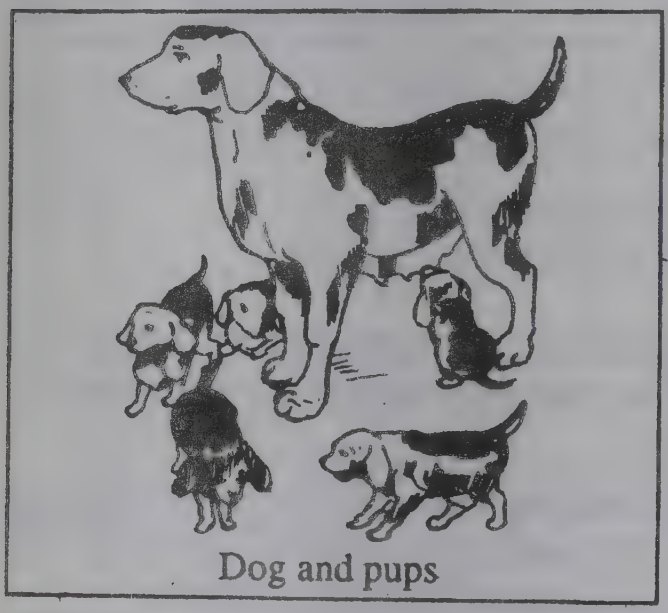
In a plastic bag keep some quantity of moist soil. Soak some bengal gram seeds and sow them in the moist soil. Observe the changes going on in these seeds and write down. Keep the soil always moist. What do you know from these observations?

The kitten of today will become a cat in future. The calf will grow into a cow or bull. Today's baby will become a human being. Small seedling increases in size and becomes a big tree. But does a pencil, a shirt or cloth become bigger? Only a living thing grows! A living being increases in volume and weight day by day. This is called growth. The growth is one of the signs of life.

You come to school from home. You play different games on the ground. The birds fly in the sky. The cow, the sheep move from one place to the other in search of food. Can a pencil, book, table and such other objects move on their own accord?

This power of movement is present in animals. This type of movement is called self induced movement.

The cow gives birth to a calf. The bitch gives birth to pups. The plant produces seeds. The seeds are the babies of plants.



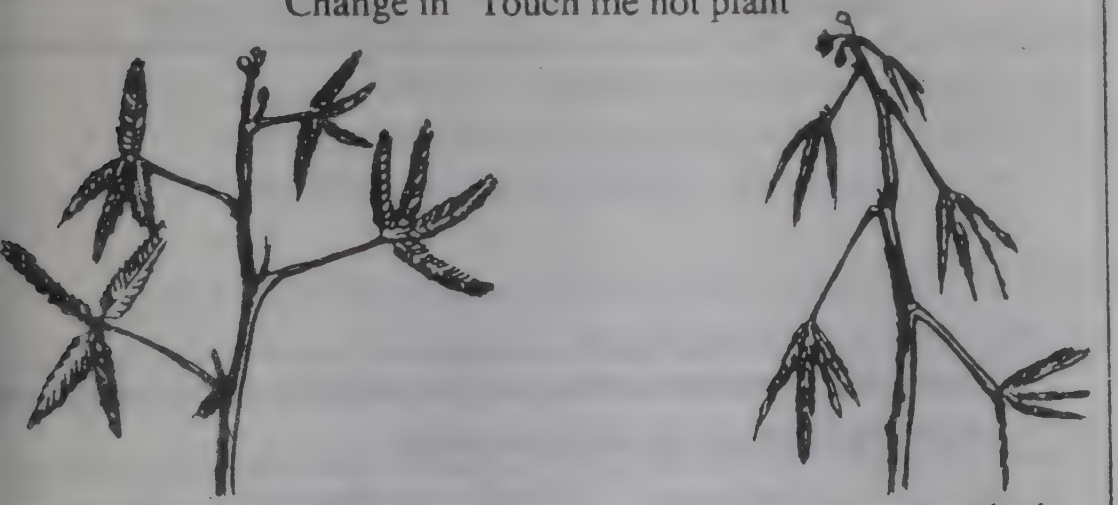
Dog and pups

On germination the seeds become plants. The bird lays eggs. But a cycle, a pencil cannot give rise to a young one. The steam engine cannot produce a tiny steam engine like itself. An adult can give rise to another living being similar to it. This is called reproduction.

Do this:-

Touch a branch of "Touch me not plant" (Mimosa pudica) What happens? Touch an earth worm. Touch a millipede by a stick. What changes do you see in these animals, after touching? On Seeing bright light what do you do?

Change in "Touch me not plant"



Normal condition When touched

Touch a small branch of "Touch me not" plant (Mimosa pudica). he leaves fold up. Touch a millipede by a stick, it coils its body. imilarly touch an earth worm, it moves away. On seeing a bright light, yelids close on their own accord. Responding to external stimulus is the haracteristic feature of a living being! The cause for response is called timulus. In the above examples can you identify the stimuli and the elated responses?

Points to remember:–

Respiration; growth; reproduction, self movement and response to external stimulus are the important features of a living being.

EXERCISES

I. Classify the following into living and non living beings and make a list:

Rat, paper, pen, coconut tree, mustard seed, lamp, rose plant, cat, butterfly, car, groundnut, ghee, cashewnut tree, coconut oil, chair, table, cycle, electric fan, radiao, rubber spring, horse, grains, maizecorn, drycutgrass, stone and idol.

The living	The non living

II Tabulate the important, differences between the living beings and non living things in the following table.

Sl. No.	The living	The non living
1.		
2.		
3.		
4.		
5.		

III What do you mean by response to external stimulus? Give two examples.

IV. What is meant by growth?

V. What is reproduction?

VI. What is self movement?

VII. Below are a few sentences. Read them and write in front of each sentence in the space the related characteristic of living thing.

(a) The teak wood sheds all its leaves on the onset of summer season:_____ .

(b) The egg hatches and the young one comes out : _____ .

(c) The plants produce seeds:_____ .

(d) A small kitten after some time becomes an adult cat:_____ .

(e) The flower bud blooms into a flower : _____ .

(f) The plants bend towards the direction of light in a garden:_____ .

X. *Do this also:–*

(1) Keep a flower pot containing a flowering plant in the classroom near the window. Observe the changes in the stem. From the observations what sign of life do you infer?

(2) Record the height and weight of a small baby of your house, every month. Continue your observations for six months. What do you conclude from these observations?

(3) In a small empty wooden box put some saw dust; use water and keep it moist .

(4) Sow a few moistured horsegram seeds in the sawdust. Observe for three weeks; keep the sawdust ever moist. Record the changes taking place in an orderly manner.

3. ADAPTATION OF LIVING THINGS TO THE ENVIRONMENT

Part – I

There are different regions on earth. Some parts of the earth are very cold. It is covered with snow. Some places are hot regions and some are deserts. A large part is the sea. All these are various environments. The different kinds of plants and animals live in these various types of environments. Do the body parts and behaviours of animals and plants growing in these areas the same? What are the reasons for differences?

The body parts, behaviours, activities of a living thing depend upon the surroundings. The living beings have to adjust to the various conditions of the environment - water, temperature, air and light. Then only they live. Otherwise they die away. This is adaptation. We shall know how various living beings adjust to the particular environment.

LIVING THINGS IN WATER

Do this:-

Just take out a fish from water and soon transfer it into water kept in a big glass vessel. Observe the movement of its fins and mouth. Take it out from water and move your palm over the body of fish from the tail towards the head. What is your feeling? Discuss with your friends.

Fish-Body parts

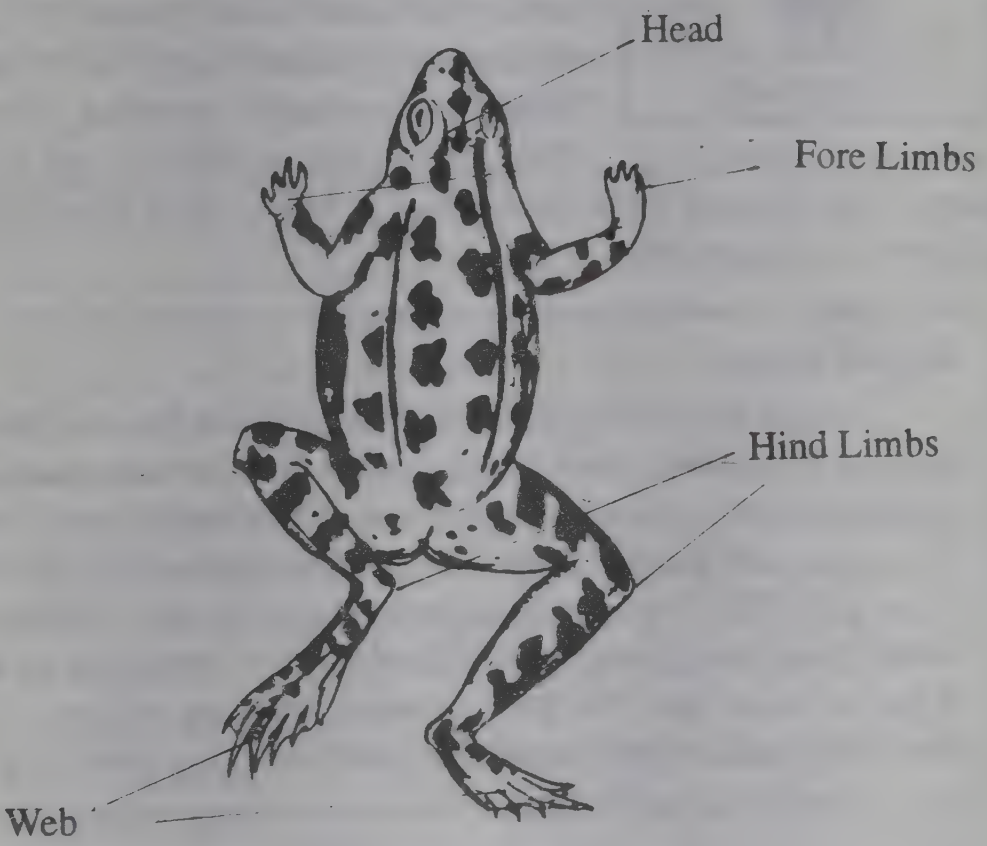
The fish is an animal living in water. Its body is covered by scales. They protect it from soaking in water. What is the shape of the body of a fish? It is boat like and it is useful to split water and to move. The fish has no limbs. In their place fins are present. Using them fish moves in water. It opens its mouth and closes very often. Why is it so? When it opens its mouth it takes in water and the water flows over gills. The gills are breathing organs of the fish. They use dissolved oxygen in water for breathing. For breathing the fish opens and closes its mouth.

Do this:-

(a) Take a big glass vessel with water. Keep a living frog in it. Observe the movements of its hind legs.

(b) Take out the frog from water and move your fingers over its body. How do you feel ? Observe the differences between its fore limbs and hind limbs. What do you see between the toes of its hind legs. Observe the shape of the head of a frog carefully.

The frog lives both in water and on land. What are the parts of the body of a frog? See the figure and know the different parts. Know how the different parts of the body is adapted to the environment? What is the shape of the head of the frog? What is the difference between the hind and fore legs of the frog? Why is it so? The body of frog is wet and slippery to touch why is it so?



The Parts of the body of a frog.

The head of frog is triangular. The shape of the body is helpful in movement. Fore limbs are short, hind limbs are long and strong with long toes, with thin skin in between. This thin skin is called Web. The frog moves in water pushing the water back using web. The frog has slimy wet skin also. The frog can breathe through moist skin also.

Plants living in water :

Nymphaea

Look at the picture. Observe the plants where do they grow? How do the parts of these plants adapt to those conditions?

The lotus, nymphaea, pistia and vallisneria, etc., are growing in water. These are water plants. The stem, leaf, flower and flower stalk, fruits of these plants are hollow, enclosing air, soft and light. So they can float. There are structures covering these parts. They do not allow water to get into these parts. 'The fruits of these plants float in water. Seed dispersion takes place on account of this.

Keep in mind:–

Only those living beings which adjust to the environment survive. Otherwise they die The fish lives in water. For protection its body is covered with scales. The body is boat shaped. So it can cleave through water. For movement it has fins. To breath it has gills. The frog lives both in water and on land. To move in water it has strong, long webbed hind legs. For breathing in water it has wet slimy skin. The parts of water plants are hollow, soft and light, can float and has structure not permitting water to get in.

EXERCISES

I. Answer the following questions.

(1) What happens to a living thing which does not adjust to its Environment?

(2) How is the shape of the body of a fish?
What is the advantage of this to the fish?

(3) Why does the fish swallow water, and let it out?

(4) What is the use of fins to the fish?

(5) What are the structures covering the body of a fish? How are they useful to the fish?

(6) What are the main differences between the fore limbs and hind limbs of a frog?

(7) How is the skin of a frog? What is the advantage of the skin for the frog?

(8) What are water plants? Give two examples.

(9) What parts of water plants are adapted to the water life?

(10) How are the parts of water plants?

II. After each of the following sentences four words are given, put a line below the correct word.

(1) The organs of movement in a frog

(a) hind limbs (b) fore limbs

(c) fore-limbs and hind-limbs

(d) triangular head and wet skin.

(2) To cleave through water the fish has

(a) triangular head (b) scales

(c) boat shaped body (d) fore-limbs

(3) To breathe in water the frog uses

(a) wet skin (b) lungs (c) gills (d) web.

(4) This is a water plant

(a) Nymphaea (b) Holy basil

(c) Green gram (d) "Touch me not"

III. ***Do this also :-***

(a) **Draw a neat diagram of a fish and label its parts.**

(b) **Draw a neat diagram of a frog and label the parts.**

(c) Pay a visit to the local tank or pond. Observe the plants grown there, take the leaf stalk of a lotus and take a cross section. See the air spaces inside.

4. LIVING BEINGS OF THE DESERT

Part – II

Some parts of the world are deserts. Sahara desert of Africa is ve famous. Thar desert is in Rajasthan. In deserts we see only heaps of san Acute shortage of water high temperature during day time, and stro wind, are the common sights in a desert. Some living beings are prese in desert.

Do it yourself:–

Bring a piece of cactus to the class. Observe the shape and colour carefully. Is it like the other plant ? Do you find leaves? What do you see in place of leaves? If leaves are found, what is its shape and size?

Flat cactus: Opuntia

Cereus

Cactus (opuntia) and Cereus (cactus with edges) are examples desert plants. Stem is thick and green. Normally there will be no leave The leaves are modified into thorns. If leaves are present, they are ver small. The green stem does the work of the leaf. The stem stores wat also. So it is thick.

The camel in the desert.

Kangaroo rat

The camel lives in the desert. How is it adapted to desert life? amel is called the "ship of the desert". The skin of the camel is thick. It n live without water for sometime. When it gets water, it drinks a large antity of water. It can store water. The animal has a soft pad in the foot. his helps the animal to walk on hot sand. It does not sweat even at high mperature (41°C).

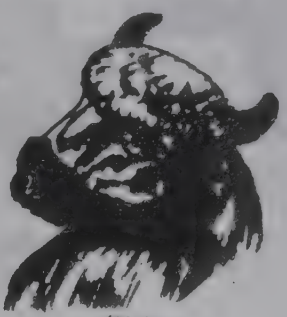
Kangaroo rats are present in the desert of Australia. There are sweat glands in their body. So they do not sweat. They do not nk water! Water is produced in the body, as a result of chemical action. This water is enough for the animal. These rats live in holes. ey come out, only during nights.

lants of the mountains:–

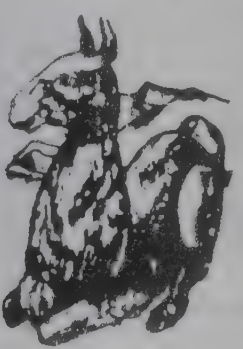
You see the plants growing on mountain tops. It is very cold there. he wind blows very fast. There is shortage of water also. Look at the hape of the leaves. The leaves are needle shaped. The leaves are covered ith wax. This controls the amount of water evaporated. The stems are hort. Ex. Silverfir, Silver birch, Jumpers etc.

Yak lives in mountain regions of India and Nepal. Lama is another ountain animal. It is found in South America. The thick and long hairs the body protects the animal from cold.

Rein Deer



Yak



Lama

In cold regions, the temperature is very low. Polar bear, reindeer and dogs live in these places. They have thick fur on their body. This protects theanimals from cold.

Penguin

Look at the picture above. Can you tell the name of the bird? It is a Penguin. It lives in the south polar region. The temperature is less than that of the ice. The bird has a layer of fat below the skin. This protects the animal from cold. The wings are modified. They look like the oars of the boat. Penguin swims in water using this. But it can not fly in air.

Animals of the sky:–

Bird - Parts of the body.

Bring a pigeon to the class. Look at the different parts of the body. Observe how the parts of the body and its shape are adapted for flying in the air.

The bird lives in air. The shape of the body is helpful in movement in air. The fore limbs are absent. They are modified into wings The body of the bird is light. The bones are hollow inside. The feathers cover the body. The feathers protect the body from **heat and cold**

Things to Remember:-

1. Acute shortage of water is faced by the living beings in the desert.
2. The stem of the desert plants is thick and green. The leaves are reduced or modified. The stem stores water. It also prepares food.
3. The camel lives in the desert. The skin is thick. It stores water.
4. The plants growing in mountain regions have short stem and needle shaped leaves.
5. Animals living in cold regions, and on mountains, have thick hair covering the body.
6. Birds fly in air. The body structure is adapted for aerial life.

EXERCISES

I. Answer the following questions:

(1) Name two plants growing in deserts.

(2) Why are leaves absent in desert plants?

(3) Name two functions of the stem of flat cactus.

(4) How is the camel adapted for desert life?

(5) Name two plants growing in mountain region.

(6) Give examples of two animals living in mountain region.

(7) Name two animals living in cold regions.

(8) How is penguin different from other birds?

(9) How is the shape of the body of the bird helpful in moving in air?

(10) Why is the body of the bird light?

II. Below are given a few incomplete statements. Select the correct word from the groups of words given, and complete the sentences.

(1) The animal that lives in the desert is_____
(kangaroo rat, reindeer, penguin, bear)

(2) _____ is the plant growing in mountain region.
(Flat cactus, Bean, Edged cactus, Jumper)

(3) The organ of movement in birds is the _____.
(wing, feather, beak, boatshaped body)

(4) The common habitat of the bird is _____.
(desert, water, air, mountain)

(5) The body of the bird is light, because of the _____.
(wings, hollow bones, legs, feathers)

III. Fill in the blanks:

1. The availability of _____in the desert is very scarce.
2. The temperature in Antartica is very _____.
3. The leaves of the plants growing in mountian regions are _____ shaped.
4. The stem of the flat cactus is _____
5. The long _____ on the body of the animals living in cold regions, protects the animal.

IV. *Do this also:–*

1. Make a list of plants and animals living in desert (collect pictures)
2. List the plants growing in water.
3. Collect the pictures of animals living in mountain regions and cold regions.
4. Draw a neat figure of a bird. Label the parts.
5. Plant flat cactus & other desert plants in a pot containing wet sand. Don't water them observe after one month.
6. Collect feathers of birds - label them.

5. SEED AND CONDITIONS NECESSARY FOR GERMINATION

A small seedling grows into a big plant. Then it produces flowers, fruits and seeds. Seeds are the young ones of plants. These seeds grow into new plants. Plants usually produce a large number of seeds. Why?

Do it yourself:– 1

Make a list of plants around you. Do they produce the same kind of seeds?

If all the seeds produced by the plants, grow into new plants, there will be no place on earth. Many seeds are destroyed. How? Think it over.

Most of the seeds are the food of animals and birds. Rice, wheat, jola, pulses are all seeds. It forms the major food of man. When the fruits are ripe, a portion of it may be washed away by rain or wind. Only a few seeds get into the soil and germinate. Let us find out the conditions necessary for the growth of seeds.

Do it yourself:–2

Examine the seeds of bean, green gram and bengalgram. Find out the differences in them.

Soak these seeds separately in different plates. Sow these soaked seeds in wet soil kept in different plastic bags. See that the soil is wet always. After 10 - 15 days, what changes do you observe in these seeds? Are all the plants alike?

The seeds of a particular plant, produces the same kind of plant. Green gram gives rise to green gram plant, and not to a bengal gram plant. So we understand that the future plant is hidden in the seed.

Do it yourself:–3

Sow a few young (unripe) seeds in wet soil.(Kept in a plastic bag) Sow a few older seeds in a wet soil.(Kept in another bag) Keep the soil wet through out.Observe after 10 days. Which of the seeds have germinated, young or older seeds?

From the above activity, we understand only older or ripe seeds germinate. The young seeds do not.

Do it yourself:–4

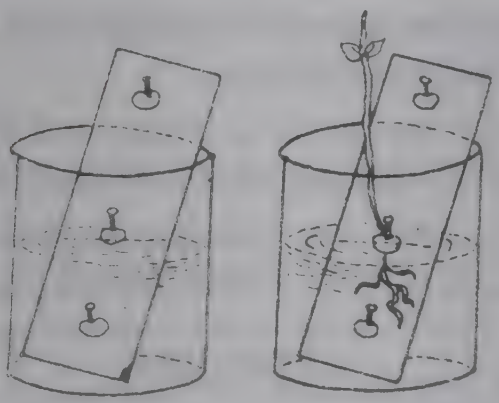
Take two plastic bags filled with mud. One is wet, the other is dry soil. Sow a few bean seeds in both the soil. Take care to see that the wet bag remains wet through out. Observe after 10 days. In which of the two bags, do the seeds germinate? Give reasons.

From the above activity, we understand that moisture is necessary for germination. That is the reason for the seeds sown in summer, germinates only after rains. In addition to moisture, sunlight, adequate temperature, air and mineral salts are necessary for germination.

Do it yourself:–5

Take three wet bengal gram seeds. Fix them to a plastic sheet, with a pin. Let all the three seeds be in a straight line as shown in the figure. Place the plastic sheet with the seeds vertically in a glass jar. Pour water into the jar. The level of the water first touches the middle seed. The seed at the bottom is completely under water. The upper seed is above the water level. Keep this for about 10 days in sunlight. See that the middle seed is always in touch with water. What changes do you see in the three seeds? Record your observations.

In the beginning



After ten days

What are the conditions required for germination?

Which of the above three seeds germinates? What may be the eason? Think it over.

The middle seed germinates. The other two seeds cannot germinate. The uppermost seed, gets air but not water. The lower most seed has vater, but no air. The middle seed gets both water and air. So it germinates. So for the germination of seed, the following conditions are necessary — Air, sunlight, temperature, mineral salts and water. We have undersood now the various conditions necessary for germination.

Activity:

Observe the different plants growing in a garden. Do you see similarity in them?

In a garden, the condition is almost the same. But some plants grow tall and some are short. Some plants are strong. Some are weak. Sometimes the plants growing from the seeds of the same species are different. The rate of growth in plants is different though the conditions are the same.

Things to remember:-

1. All the seeds produced in a plant, do not germinate.
2. Some of them are destroyed by rain or wind. Some seeds form the food of birds and animals.
3. The conditions required for germination of seeds are:- I. Water, II. Sunlight, III. Temperature, IV. Mineral salts V. Air.
4. Though the conditions for germination are the same, the rate of growth of plant is different from plant to plant.

EXERCISES

I Answer the following questions.

1. What are the three ways by which some seeds are destroyed?
2. Why do plants produce more seeds?
3. What are the important conditions required for germination of seed?
4. What should be present in the moist soil for a young plant to grow?

II **Bellow are given some statements. Some are true and some are false. Mark (√) before the correct statements and mark (x) before the wrong statements.**

(i) Bengal gram germinates into bengal gram plant. ( )

(ii) Plants do not produce seeds in large numbers. ( )

(iii) Unripe (young) seed germinates into a seedling. ( )

(iv) Of all the conditions necessary for germination, water is very important factor. ( )

(v) Air is not required for germination. ( )

(vi) If there is no sufficient temperature the seeds cannot germinate. ( )

(vii) Sunlight is not required for germination of seed. ( )

III *Do this also:–*

a) Take a wooden box. Put some mud in it. Water it. Sow 10 - 15 bean seeds in it. Water the seeds now & then. Keep the box in sunlight. Observe the changes in the seeds for about 30 days. Record your observation.

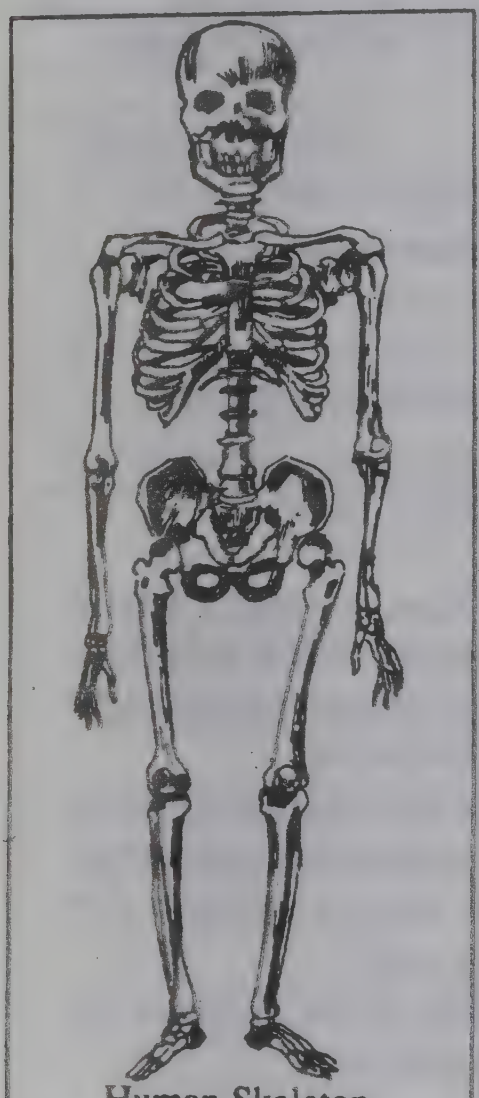
b) Take a flower pot with wet soil sow some green gram in it. Cover a earthen pot over it. Let it cover the flower pot completely. Keep the soil wet. Remove the cover after 10—15 days. What do you see now?

c) Collect the seeds of different plants. Observe the difference in their size, shape and colour.

6. HUMAN SKELETON

There are many organs in our body. Can you name them?

Ears, eyes, limbs, nose and mouth are external organs. There are some organs inside our body. Each organ has a definite work to do. A group of organs doing the same type of work, is called an organ system. What are the organ systems in our body?



Human Skeleton

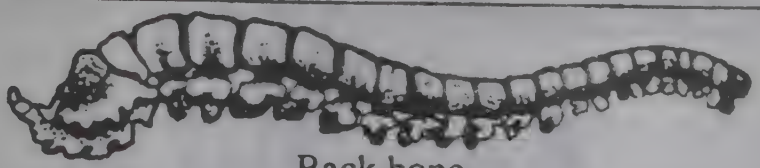
The group of organs connected with breathing, is called the respiratory system. The organs that help in the digestion of food is called digestive system. In addition to these, we have in our body the circulatory system, nervous system and so on. There is another organ system which supports and protects all these organs. This is the skeletal system. This consists of a number of bones. These bones provide a definite shape to our body. The skeleton is the frame work of bones. This is also a system. Feel the body of earthworm. It is soft and smooth. There are no bones in the body of an earthworm.

There are about 200 and more bones in the human skeleton. Some are small, some are big. The human skeleton consists of (i) skull, (ii) the vertebral column, (iii) ribs, (iv) pectoral and pelvic girdlle and (v) bones of the limbs.

Skull:– The bones of the skull are strong and flat. These bones are attached to one another. The upper jaw is attached to the skull. The lower jaw is attached to the upper jaw near the ears. By

the movement of the lower jaw, we can open our mouth. The skull protects the important organs like brain, eyes, nose and ears.

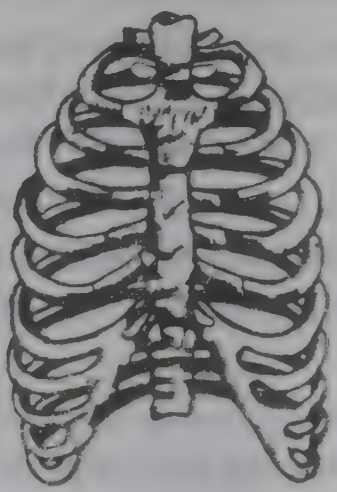
Back bone or Vertebral column:–



Back bone

The back bone is made of 33 small pieces of bones. Each piece is called vertebra. The vertebrae are placed one above the other forming a chain. Because of this kind of attachment we are able to bend our body forward, backward and sideward.

The Rib cage:–



Ribcage

This cage is formed by 12 pairs of bones called ribs. These ribs start from the vertebral column and meet the sternum or the breast bone. Only 10 pairs join the breast bone. The eleventh and twelfth ribs do not join the breast bone. The cage formed by the ribs protect the heart and the lungs inside.

Bones of the Limbs:–

Look at the picture. The bones of the hand and leg are almost alike.

The bones of the arms are attached to the shoulder girdle. The bones of the legs are attached to the hip girdle.

Joints:–

You know that there are a number of bones in our body. These bones are attached to one another. A joint is formed where two or more bones meet. There are two types of joints — movable and immovable.

Muscles are attached to the bones. The movement of the bones are brought about by the contraction and expansion of muscles. Based on these movements, the joints are named. Let us understand a few joints in our body.

I. **Hinge joint:**

The joints in the elbow and knee move like the hinge.

II. **Pivot joint:**

The joint found between the vertebral column and the skull is an example of this. The skull moves round the pivot.

III. Ball and Socket joint:

The round end of one bone exactly fits into a cup shaped portion of another bone. Joints of the shoulder and hip are examples of this type of joint. These joints allow free movement of arms and legs.

IV. **Gliding joint:**

The joints of the wrist, ankle and backbone are examples of this kind of joint. The bones glide.

Immovable joints: The bones of the skull are attached to one another. But they cannot move.

Muscles: The bones cannot move on their own. They need the help of muscles for movement. The muscles can contract or expand. As a result of this, the bones move. There are two types of muscles in our body — voluntary and involuntary muscles.

Voluntary muscles: There are certain actions in our body. Which are under our control. They move according to our will. The muscles of arms, legs, neck etc. are examples of voluntary muscles. With the help of these muscles we walk, jump and run.

Involuntary muscles: There is movement in the internal organs of our body like the intestine, stomach etc. But the movement of these muscles are not under our control. Involuntary muscles are at work since birth and it goes on till death continuously.

Points to remember:–

There are a number of organ systems in our body.

The skeleton system protects all the organ systems of our body.

The human skeleton system consists of skull, vertebral column, ribs, bones of the limbs, upper jaw, lower jaw.

There are two types of joints — movable and immovable.

The muscles help in the movement of bones. They are of two types Voluntary and involuntary.

EXERCISES

I. 1. State the chief functions of skeleton?
2. Name the organs that are protected by the skull and ribcage?
3. The vertebral column is like a chain. What is its advantage?

4. How many types of joints are there? Name them.
5. What are voluntary muscles?
6. What are involuntary muscles?

II. Fill in the blanks with suitable words:

1. There are more than _____ bones in the human skeleton.
2. The bones of the arms and legs are _____.
3. Only the _____ jaw is movable.
4. Shoulder girdle is an example of _____ joint.
5. Knee and elbow joints are examples of_____joint.
6. _____ joint is responsible for rotatory movement of the head.

Do this also :-

1. Let the children stretch the hands forward and upward. Which joint helps in this movement. Where else do they find a similar joint ?
2. Rotate the arm. Which joint helps in this movement?
3. Let the children observe the joints that help us while running, skipping and doing exercises.
4. Ask the children move their head or limbs in different directions. What are the muscles that help in this movement?

7. PHYSICAL EXERCISES AND GOOD POSTURES

Exercises are very necessary for our body to keep ourselves fit. By doing exercises regularly and systematically, our muscles grow strong. Muscles need food and oxygen to do work. The blood carries food and oxygen to the muscles. The digested food enters the blood stream. When the heart pumps, blood is carried to various parts of the body through blood vessels. By systematic exercises, the muscles grow stronger. Exercises keep the organs in good condition and help to maintain good health.

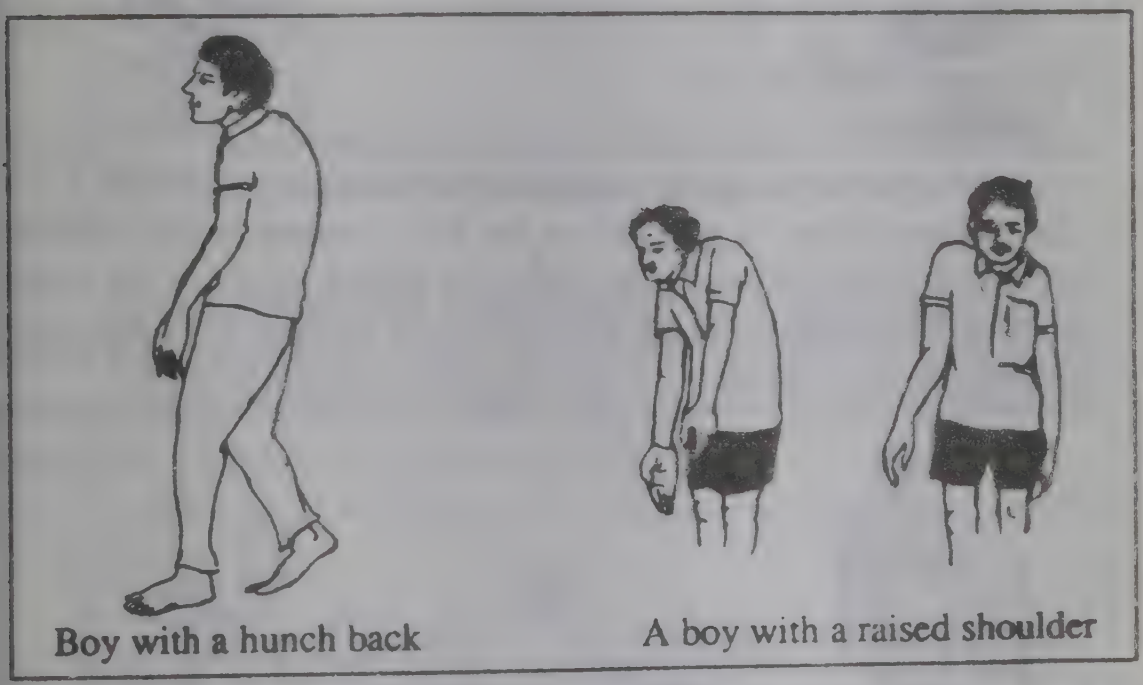
The person who does not do exercises regularly will not be active. He cannot discharge the duties properly. His face will be pale.

When the muscles work, certain waste products are produced. When these waste products accumulate, fatigue sets in. The muscles stop working. They need rest and nourishment. The muscles start working after rest. By regular exercises also, we can keep the muscles in good condition.

Do this activity:-

Visit a gymnacium nearby. Observe the muscles of people doing exercises. Try to know the importance of physical exercises.

Improper postures:-



Boy with a hunch back

A boy with a raised shoulder

Look at the pictures above. The boy in the first picture has a hunch back. The boy in the second picture has one side of his shoulder raised. Why?

When they were young, perhaps they did not practice correct way of walking or sitting. They have also neglected exercises. As a result of this, you find deformity in their posture.

You know that the bones give our body proper shape. The bones also project the organs in our body.

The bones of children are not very hard as in the case of adults. As the body grows, the bones become harder. Since the bones of children are tender it is possible to change the shape of the body or bend slightly.

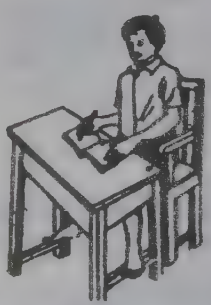
The way you walk or sit when you are young counts a lot.

Correct posture:-

Correct posture

Wrong posture

Your habits play a very important role in shaping your body. Look at the pictures below. In picture one, the boy is standing erect with his chest forward. Do not bend your back. The second picture is the wrong posture. From childhood itself, you must walk straight and stand erect. While sitting also you must sit straight and not bend the body.



Correct

Wrong

While standing or sitting, the chest must be erect and both the shoulders should be straight and at the same level.

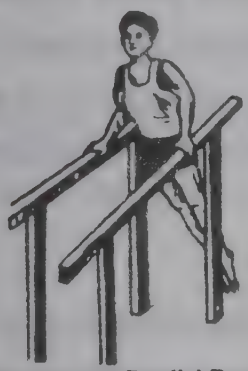
Right shoes and dress:

The type of dress and the footwear that you use is also very important. Do not use tight dress or foot wear. The growth of the body or feet will be stunted. The flow of blood to the legs will be obstructed. This

will have harmful effects.

Games and physical exercises help build a healthy body. Suryanamaskar is a very good exercise. All the bones and muscles of our body get good exercise by suryanamaskar

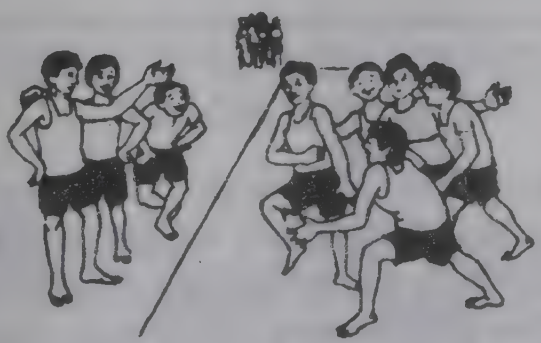
Suryanamaskar



Exercises on Parallel Bars

By playing games like kabaddi and doing exercise, the bones and muscles develop well.

Children should play games regularly in the open sunlight. They should develop this habit. Milk, eggs, butter and vegetables help in the growth of bones. Doing suryanamaskars,drips bytaks every morning in open fields helps the bones grow correctly.



Kabaddi

Kabaddi is a brisk game. It gives exercise to muscles.

Things to remember:–

1. Regular exercises help in growth and development of bones and muscles.
2. Exercises are also useful in improving digestion and respiration. It also keeps the body healthy.
3. Practising correct postures from early child hood is essential.
4. By such practices we can avoid deformities like hunch back or defects of shoulders.

EXERCISES

1. What are the effects of neglecting exercises in young age?
2. Why is it possible to change the shape of the bones of children?
3. What are the harmful effects of using tight clothes and shoes?
4. Why should we develop the habit of correct postures?
5. How is suryanamaskar helpful?

Do this also:–

1. Practise correct way of walking, standing and sitting.
2. Observe your friends while walking or sitting. If they do not follow the correct posture advise them to correct it.

8. OUR FOOD

We move about from place to place. We play and do different kinds of work everyday. Even when we are sitting or sleeping, the different organs of our body will be working. Energy is needed for work. From where do we get the necessary energy to do work? Food supplies energy.

Do it yourself:–

Make a list of food that you take every day.

Time	Food taken
Morning	
Afternoon	
Evening	
Night	

There is no single food that can supply all the nutrients required for our body. Each item of food contains one or two nutrients.

Based on the nutrients present, our food is divided into five groups.

(1) Carbohydrates
(starch and sugar)
(2) Fat
(3) Proteins
(4) Minerals and water
(5) Vitamins

Pulses are rich in proteins. Ex. Dal, Greengram, Black-gram etc.

Picture of food containing proteins

Nutrients of food: You know that the food that we eat is divided into five groups. Various nutrients are present in our food. Each food item contains more than one nutrient. The percentage may vary. We need all these nutrients for healthy living. Any deficiency in any of the nutrients, will result in weakness or diseases. Then what are the nutrients required for growth?

Nutrients required for growth:

A very important substance present in the food that we eat is protein. Almost every part of the body contains proteins. Protein is necessary for growth. It is present in eggs, meat, fish and pulses. Pea, turdal, black gram, groundnuts are called pulses. Milk is rich in proteins. Proteins also help in the repair of lost parts.The skin and the muscles get fresh cells every day. Addition of new cells is growth. Who needs more proteins? Evidently, it is the child. Old cells in our body die and they are replaced by new cells. Protein is needed for developing new cells. Protein also gives ability to resist diseases. Protein is needed for pregnant women. The deficiency in proteins particularly in children of the age group of 1—2 years results in under development of brain. Such children become dull.

Food for energy:

Energy is needed for work. It also keeps the body warm. Motor moves with the help of petrol energy. Fan uses electric energy for rotation. Then which energy helps in the day activities of the body.

Energy Food

Look at the picture. Can you now tell the source of energy for our daily work? Rice, ragi, wheat, potato are rich in energy. This group is called cereals(carbohydrates). It consists of starch and sugar. Canesugar, fruits, honey etc. contain sugar.In addition to starch and sugar, fat also provides energy. Ghee, milk, oil contain fat.

Fat provides more energy than carbohydrates. Excess of fat is stored in the body. This stored fat is used

whenever necessary. Fat is not easily digestable. So we should be careful. When fat is taken in excess, it prevents the circulation of blood.

Protective food:

Carbohydrates supply energy required for various activities of the body. Protein is needed for growth and protection of the body tissue. It also helps in the repair of lost parts. Vitamins and minerals help in the prevention of diseases and also in protection and control of various activities. These are healthy food stuff. Which food provides you all this?

Vegetables & Fruits

Observe the above picture. You see vegetables, fruits. The common vegetables that we eat everyday are greens, carrot, cucumber, brinjal etc. The common fruits are grapes, mango, apple, banana etc. Vegetables and fruits regulate the working of various parts of the body.

Minerals and Vitamins:

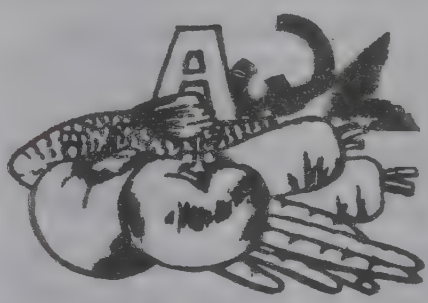
In addition to the four groups mentioned above our body needs some constituents in small proportions. They are the minerals. The most important are calcium, phosphorus, Iron and Iodine. Milk and its products are rich in calcium. Vegetables like drumstick, green-leaves also contain calcium. Calcium is required for the teeth and the bones to become hard. Growing children need more calcium than adults. Deficiency of calcium results in (Rickets) disease. Calcium helps in coagulation of blood.

Haemoglobin gives red colour to blood. Iron is present in egg, jaggery, ragi, jola, drumstick and bittergourd. Deficiency of iron resu in anaemia. Iodine controls the use ot energy by our body. This is present in sea fish. Deficiency of iodine causes goitre. Phosphorus is also one of the important minerals of our body. We get minerals from meat and vegetables.

Vitamins:

For proper functioning of our body we need vitamins. These are present in vegetables and fruits. By taking these vitamins, many diseases can be avoided.

Vitamin 'A': It is present in codliver oil, milk, curds, eggs and butter. Vegetables like greens, drumstick, sesbania (Nugge), carrot, tomato fruits like papaya, orange, mango are rich in vitamin 'A'. This is needed for good eyesight, body development and healthy skin. The deficiency of vitamin 'A' causes night blindness, reduction in weight and reduces the resistance power.



Vitamin 'B': It is made up of a number of subgroups. This is required for the proper growth of the body specially the heart and the brain. Vitamin 'B' is present in hand pound rice, wheat, jowar, ragi, pulses, milk curds,eggs, cabbage, cauliflower, liver of animals and some fruits deficiency of vitamin 'B' causes 'Beriberi' and pellagra (wrinkling o skin).

Vitamin 'C':- Citrous fruits are rich in Vitamin 'C' Ex.Orange, gooseberry, tomato, greens, milk, guava fruit, sprouting seeds etc. Vitamin 'C' is necessary for the healthy skin and teeth gums. It also helps quick healing of the wounds, repair of tissue, and circulation of blood. One small gooseberry contains as much of Vitamin 'C'' present in two oranges. Deficinecy of vitamin 'C' causes severe bleeding of gums and swelling of joints

Vitamin 'D'

This is essential for growth and development of bones. Children need more Vitamin 'D'. Codliver Oil, milk, Sun rays are rich in Vitamin 'D'. When sun rays fall on our skin, vitamin 'D' is produced to some extent. Deficiency of Vitamin 'D' causes rickets.

Balanced diet.

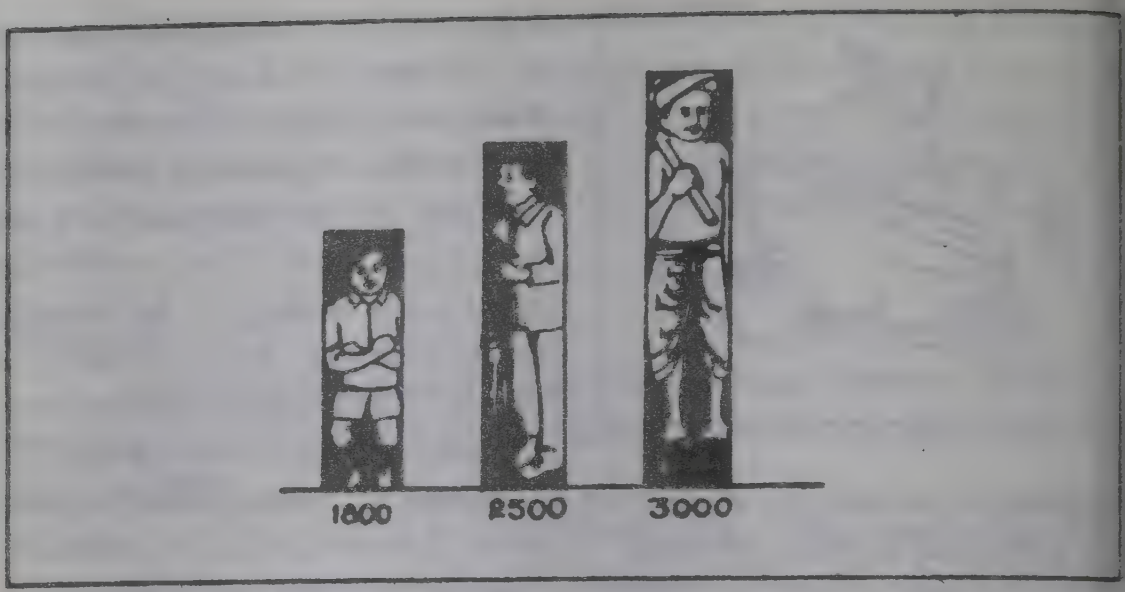
You know the different types of food and the nutrients present in them. They are the (i) energy producing food (ii) protective food (iii) food for growth.

We need all these types of food for maintaining health. We can not live by eating only rice or ghee or pulses. All these are needed. Food which contains all the constituents like carbohydrates, proteins, fat, minerals, water and Vitamins in sufficient quantity is called a "balanced food". By taking a balanced diet our body grows, gets resistance against diseases and energy required for all the activities

Balanced food:

The food required depends upon age, and nature of work. People who work hard need more energy food.

The following diagram illustrates the quantity of food needed by different people.



Different Food habits in the Community:–

Activity:-

1. Ask the students to prepare a list of food that they eat every day.
2. Let them also prepare another list of food that they eat during festivals and other occasions.
3. Let the children compare the food that they eat and their friends.

From the list prepared by the students, we understand that the food varies from person to person. People in South Karnataka eat ragi. People living in Malnad, South Canara (Dakshina Kannada) and other places eat mostly rice. People living in Bijapur and other neighbouring places eat Jola. In North India wheat is the common food. People living in coastal areas eat fish. We depend upon the food that is grown in the locality. It varies from region to region. Food habits also change from place to place depending on availability, climate, customs and many other factors. We also eat variety of food. During festivals and other special occasion we prepare special items like pongal, pudding, sweets, payasam and so on.

Some people eat only rice, ragi, Jola, Pulses and vegetables. Such a diet is called vegetarian diet. Some people eat fish, eggs, meat etc. Such

a diet is called non vegetarian diet. Both are good for health. Whatever may be our diet, care should be taken to see that we take balanced bone It should consist of cereals, pulses, meat, eggs, vegetables, fat, fruits etc. in proper proportion. Our food should contain in addition to the above, greens, sprouting seeds etc..

Food also varies according to age and the type of work that we do. Growing children, pregnant women, sick people need nourishing food.

Carrot, cucumber and such other vegetables are eaten raw.

We cook rice, cereals and certain other items. By cooking, food becomes soft and easily digestable. We use many beverages like coffee, tea, etc. Our morning work starts with a cup of coffee or tea. Coffee and tea are stimulants. But we must take limited quantities. Excess of coffee or tea is injurious to health.

Fried food is very tasty. We like it very much. But we must take only limited quantities.

In some areas boiled rice is used. We can prepare idli or dosa using boiled rice.

Storage and Preservation of food:-

We need air, water and food. Where do we grow food? We eat food grains, vegetables and fruits grown in the fields. Do we use all the food crops grown in fields? A large quantity of food produced, is wasted at different levels by various means. A small quantity of food is wasted at the stage of collection of food. Lack of proper preservation facilities is also one of the reason for loss of food. If there is moisture in food, food gets spoiled, Yeast and bacteria develop very quickly on moist food. Rodents and insects feed on food. This is also one of the reasons for loss of food. So there is need for proper storage and preservation of food. Researches are undertaken in this direction. Why do we store food? Food, vegetables and fruits are generally grown during a particular season. But we need food throughout the year. The excess food grown during harvests need to be stored for future use.

Do it yourself:–

Try to know how pickles, morabbas are prepared and preserved at home.

Points to be remembered:–

(1) Food grains should be dried and then stored in gunny bags for future use. By drying the water content is dried. Bacteria, Yeast etc acts on wet seeds.

(2) Food is also stored in airtight tins. This method is called canning , eg.Squashes and Jams: Food can be preserved for longer periods.

(3) Some bacteria can not grow at very low temperature. So food is stored in refrigerators. Vegetables and fruits are stored in this way.

(4) Milk is boiled upto a particular temperature and then cooled. This method is called "Pasteurization".

(5) Sugar and salt are used as preservatives in the preparation of morabbas and fruits juice.

Things to remember:-

Our food is broadly divided into carbohydrate group, protein group, fat group, vitamins, minerals and water.

All these food stuffs are required for healthy living. Our food is mainly divided into following groups based on function, namely: energy producing, body building or growth and protecting. Food habits vary from place to place depending on availability. Sprouting seeds, fish, boiled rice are used. Fried food should be avoided or minimised. Keeping food for future use in houses or other places, is called storage. Food is stored by different methods like drying, refrigeration, Pasteurization and canning. Salt and sugar are used as preservatives.

EXERCISES

(1) Why do we need food?

(2) What are the different groups of food based on its function?

(3) We should not eat fried food. Why?

(4) What is meant by storage of food?

(5) Mention the methods of preserving food.

(6) What is a balanced diet?

(7) Match the following

A	B
(1) Canning methods	(a) Storing of food grains like paddy, dal , etc.
(2) Pasteurization	(b) Jam, jelly pickles are stored in tins and sealed air tight.
(3) Refrigeration	(c) Preserving food at very low temperature.
(4) Drying	(d) Boiled upto a particular temperature and then cooled.
	(e) Morabbas and pickles.

Do this also:-

(1) List the food stuff used in your house, classify them into 3 groups based on their function.

(2) Visit a nearest Health Centre and collect information regarding vitamin deficiency diseases.

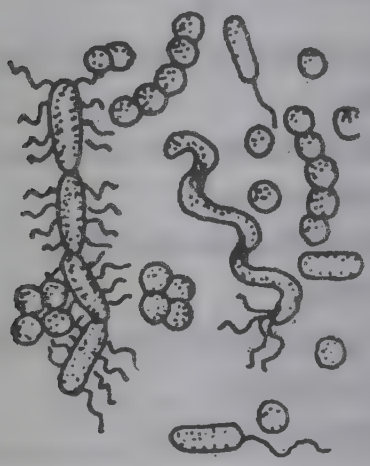
(3) List the balance diet, based on the food that you take every day.

(4) Make a list of food items preserved in your house. Discuss about the different methods employed in preserving food.

9. INFECTIOUS DISEASES

"Health is Wealth" is a common saying. An unhealthy man cannot enjoy life. Everything without health is a waste.

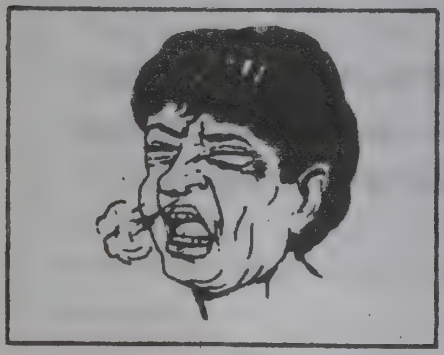
All of us have suffered from fever, cold or cough sometime or the other. How do we get these diseases? What are the causes? For a long time people believed that diseases are caused by the curse of God. They used to offer animals to please god. These are all superstitions. Diseases are caused by minute, microscopic organisms. They are bacteria or virus. We also get some diseases due to deficiency of nutrients.



Bacteria are very minute organisms. You can not see them with your naked eyes. They can be seen only through a microscope. These bacteria have different shapes. Some are round, some are rod like and others are spiral. These bacteria are present in air, water and soil. They enter our body through water or food. Sometime they enter through the air that we breath. After they enter our body, they multiply. Virus are still smaller than bacteria. They cause diseases like cold and cough. Such diseases are called infectious diseases. These diseases spread through air, water or food.

Diseases Transmitted Through Air:

Certain diseases are spread from individual to individual through air. How is this caused? Look at the picture.



When we cough or sneeze, disease causing germs in our body are thrown out. When a healthy man breathes this air, he gets the disease. Here air acts as a medium for the transfer of diseases. Diseases like tuberculosis, diphtheria, whooping cough are some of the diseases where germs are

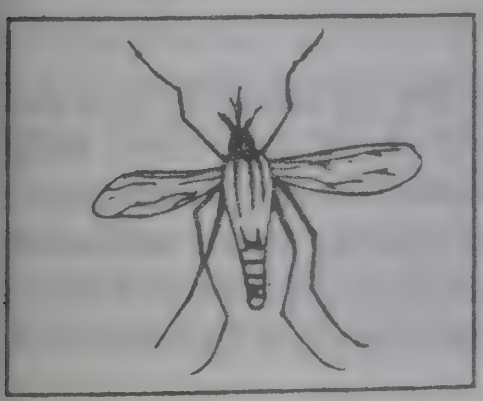
transmitted through air. When the patient coughs or sneezes, the germs enter air. These small germs enter the body of the healthy man and cause diseases. So while sneezing or coughing, we have to cover our mouth with a kerchief.

Diseases Transmitted Through Food & Water:

Cholera, typhoid, diarrhoea are some of the diseases transmitted through water. When a patient suffering from cholera passes faeces or vomits, the bacteria present in it get mixed up with flowing water. If a healthy person drinks this water, the disease germs get into the body. Sometimes cholera germs are transmitted through food. Housefly acts as carrier of these germs. The legs of the housefly has hairs. When the house fly sits on faeces or vomit of the cholera patient, the disease germs sticks to the hairs. When the same house fly sits on our food, the germs are transferred to our food. When we eat such food, the disease germs enter our body multiply very quickly. The healthy person gets the disease. How to prevent it? You have seen how sweets and other foods are kept in some places and shandries. They are kept exposed. You will also see a swarm of house flies sitting on it.

Children should be advised not to eat food kept uncovered that are sold in the streets. Similarly, children should be advised to drink protected water. In the absence of that, water should be boiled, filtered and then used. Food should always be covered both at home and outside. By spraying insecticides now and then insects like housefly, mosquitoes can be avoided. It is advisable to drink boiled and cooled water.

Diseases Transmitted by Insect - bite:



Mosquitoes spread malaria and elephantiasis. There are different types of mosquitoes. Female anopheles mosquito spreads malaria. Sir Ronald Ross discovered this. He got Nobel Prize for this discovery. Culex mosquito spreads elephantiasis. The legs of the patients will be swollen.

Mosquitoes must be destroyed in order to prevent malaria. Disinfectants should be sprayed both inside and outside the houses. Mosquito lays eggs on stagnant water. So care should be taken to see that stagnant water should be removed. Insecticide should be sprayed. Mosquito nets should be used at nights.

Diseases Transmitted Through Contact:

Eczema and other skin diseases are caused by human touch or contact. Doctor's advice should be taken for treating people suffering from skin diseases. The clothes used by such patients should be first soaked in dettol and then washed. Smallpox is also another disease that spreads through contact.

Prevention of Epidemic Diseases:-

Epidemic diseases and the Prevention by vaccination or inoculation:-

When the disease germs enter our body they are destroyed by antigen or antibody produced by blood. The vaccine contain disease germs and when they are infected into the body it fights against the actual germs. In this way by vaccination or inoculation we can prevent certain diseases. Small pox which was once a deadly disease has been eradicate

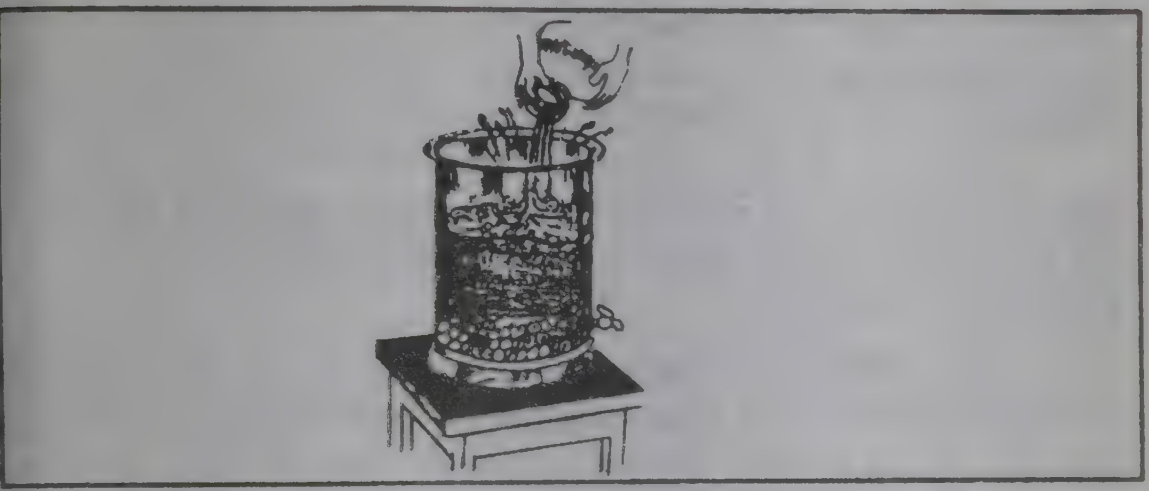
Inoculation:–

Diseases like typhoid, cholera can be prevented by inoculation. B.C.G. is given to prevent T.B. Triple antigen is given to young children in order to prevent diptheria, whooping cough and tetanus. In order to prevent Polio, Polio drops are administered to children.

Keeping Food and Water Clean:-

You already know that many diseases are caused by food and water. By keeping these two requirements of our body clean, many diseases can be prevented. How is this possible? Drinking water should be clean and free from disease germs. By drinking boiled and cooled water many diseases can be prevented, when large quantities of drinking water are required, it is filtered. It is a simple device of filtering water.

Sand, small stones and charcoal are kept in three pots, When water passes these three pots, it gets purified.



In big cities water is filtered using bleaching powder. Water in the wells can be purified by adding potassium permanganate or bleaching powder. The disease germs are killed and water becomes pure. The vessels used for carrying and storing water should also be cleaned.

Keeping Food Cleaned:-

The food that we eat should be always be covered. This prevents flies from sitting on food. Vegetables should be cleaned before used. Fish is preserved in a mixture of salt and ice. It is also dried, sometimes it is kept in cold storage. Kitchen should be kept clean and fully ventilated. Persons who cook food and serve food should wash their hands clean. This helps to prevent diseases.

Cleanliness of The Environment:

A good environment is very essential for healthy living. It is very necessary to keep our environment clean. The food that we eat, the air that we breathe, and the water that we drink must be free from disease causing germs. Cleanliness will go a long way in preventing many diseases.

Government has taken lot of measures for keeping the environment clean. There is a special department for that. Health officers and sanitary inspectors, civic bodies like corporation, municipalities and mandal panchayats work hard to keep the environment clean.

It is very difficult to get pure air in big cities. Air is polluted wit smoke, dirt, dust and some poisonous gases. Drain water will be a sourc of many diseases. Mosquitoes breed on stagnant water and cause malaria Insecticides are sprayed on stagnant water to destroy mosquitoes. Tre planting in cities is encouraged nowadays. This will ensure pure air.

We must all join together to keep the environment clean an tidy. The surroundings of our houses and schools should be kept clear We have to pay greater attention towards cleanliness,

Cleanliness of Home:–

Cleanliness idea should start from our house. We must tak special care to see that flies, mosquitoes, cockroaches and bugs ar kept out of our houses. Houses should be cleaned daily. Now an then spraying of insecticides will destroy all the insects. Latrines bathrooms should be cleaned with phenol. Proper drains should b made for the water to flow. Proper ventilation is also very essentia Unwanted and waste things should be deposited in dustbins. It shoul be collected in polythene bags and deposited in dustbins everyday Waste materials should not be thrown to the streets.

Cleanliness in Schools:–

Class rooms must be free from dust. It is not healthy t breathe air filled with dust. Waste paper, waste materials should nc be thrown in class rooms. A dustbin should be kept in each clas room and all the students should make it a habit to deposit wast paper, banana peels etc., in the dustbins only. The contents shoul be removed everyday and deposited in a particular place outside th classroom. Otherwise disease causing germs grow on dirt environment. Spitting every where should be avoided. Spittoons wit sand should be kept in the school premises. Children should b taught the proper use of toilets and urinals. The toilets should b kept clean by using phenol.

Cleanliness in Society/Environment:–

We should not throw waste materials on the roads. Such thing should be deposited in dust bins. Passing urine anywhere and everywher

hould be avoided. Latrines meant for public use should be used. We must ry our best to keep our environment clean.

Whereever underground drainages are not formed, pits should e dug outside the village. The faeces should be covered by mud. Otherwise houseflies will sit on the faeces. Thus we can prevent the spread of diseases.

Passing stools and urine very near the well or tank should be avoided. Because these are the sources of drinking water. We must try our best to keep our houses, schools, play ground and places around clean and tidy. Sneezing, spitting everywhere is a bad habit. By following healthy habits, we can prevent many diseases. You are aware of this already.

Disease causing germs develop on cowdung heaps and on rotting things. These germs enter the air and through air, they transmit many diseases. To avoid this a deep pit should be dug. Cowdung, leaves and other waste materials should be deposited there. Soil should be covered on it. This method helps to control the diseases. We can produce gobergas and biogas from cowdung. How?

Gobergas–

Collect the cowdung and excreta of other animals in a big tank. Mix it with sufficient quantity of water. After it is completely decomposed, a gas is produced. The gas is conveyed through pipes and used for cooking, heating and lighting. This will solve fuel problem and also control pollution of the atmosphere. After the gas is used, the cowdung can be used as manure as usual. A similar gas can be produced from plant waste.

Biogas:–

This is produced on the same lines of gobergas. Plant waste products are collected in big tanks and allowed to decompose. The gas is used for cooking, heating and for lighting. The remaining material after the a gas is produced, is used as manure.

You might have seen some people picking up waste paper, broken bottles and plastic things. These waste materials are sent to the factories and used to manufacture paper, glass and plastic out of it.

Things to Remember:-

Tuberculosis, cholera, typhoid, flu, diphtheria, whooping cough and such other diseases are called communicable diseases or epidemic diseases. They are caused by bacteria and virus. The disease causing germs are transmitted through air, water, food, insect bite and contact. When these germs enter the healthy body they cause diseases. When the disease germs enter our body they are destroyed by antigen or anti-body produced by blood. The vaccine or inoculation contains disease-germs and they are injected into the body, it fights against the actual germs.

Cleanliness is very essential for healthy living. So we have to take care to keep our houses, schools, and the environment clean. Throwing waste materials on the road should be avoided. Such things should be deposited in dustbins. Spitting every where, sneezing etc., should be avoided. Useful things like gobergas can be got from waste materials. Waste materials like pieces of paper, glass pieces, plastic-ware can be reused. This helps to use the natural resources continuously.

EXERCISES

(1) What is an epidemic disease?
(2) What are the different methods by which epidemic diseases are spread.?
(3) Name the insects that spread malaria, elephantiasis.
(4) What precautions are taken to prevent communicable diseases in children?
(5) What are the methods by which communicable diseases are prevented?
(6) How is water in the well purified from germs?
(7) Mention the measures to prevent pollution of the environment?
(8) How is gobergas and biogas produced.?
(9) What are the measures taken for conservation of natural resources?

Do this also:-

1. Observe spraying of disinfectants in your school or at home or in your locality and make a list of common disinfectants used in the locality.
2. Make a list of articles that can be produced out of waste materials.

10. SOIL EROSION AND CONSERVATION

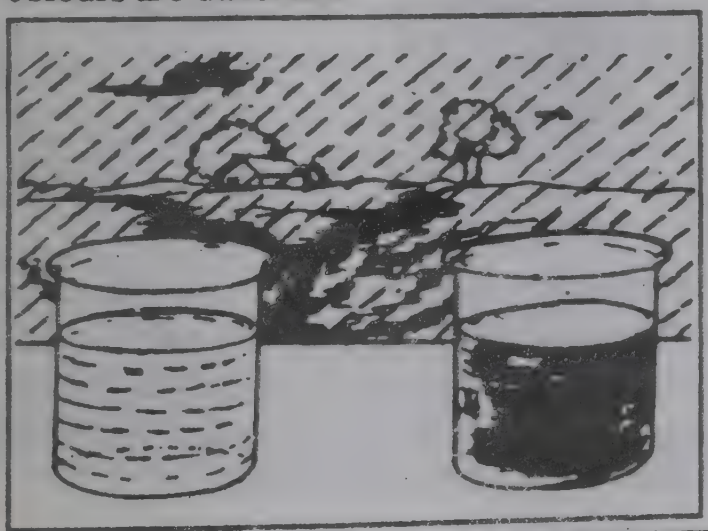
PART - 1

Soil Erosion by Water:–

You feel happy when it rains. You like even to be drenched. The rain water falls on the earth and then flows. You have observed this. What will be the colour of water which flows on muddy roads? What is the reason for this?

Do it Yourself:– 1

Collect rain water directly in a glass vessel(A). Collect water flowing on the roads after rainfall in another glass vessel(B). Observe the difference in colour. Both are rain waters. But the colours are different.



Keep both the vessels (A&B) without shaking for sometime. You observe soil particles at the bottom of the water in the glass vessel B. Where does this soil come from?

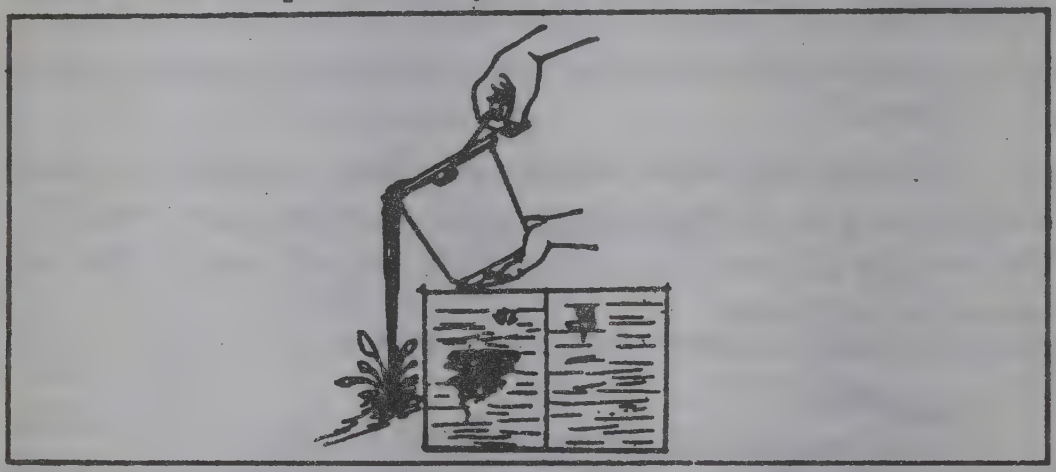
When the rain water falls on the soil it loosens the soil particles. Later these soil particles are carried by the flowing water.

When rainwater falls on the soil it flows towards the lower parts. This rain water joins streams or rivers. The colour of this water will be the same as the colour of the soil of that area. When the water flows with force it carries with it the top soil and stones. The force of flowing water gradually decreases, the mud and the stones settles down. You might have seen the silt being removed during summer from the tanks. This silt is a very fertile manure.

Where was this soil originally? How did it come to the tank? Think over.

Do it yourself:– 2

Go out into the school grounds. Take a bucket full of water with you. Select a place where the grass is not growing. Pour water in the bucket over the ground slowly and continuously. Observe the place where water was poured. Do you see any change in that area?



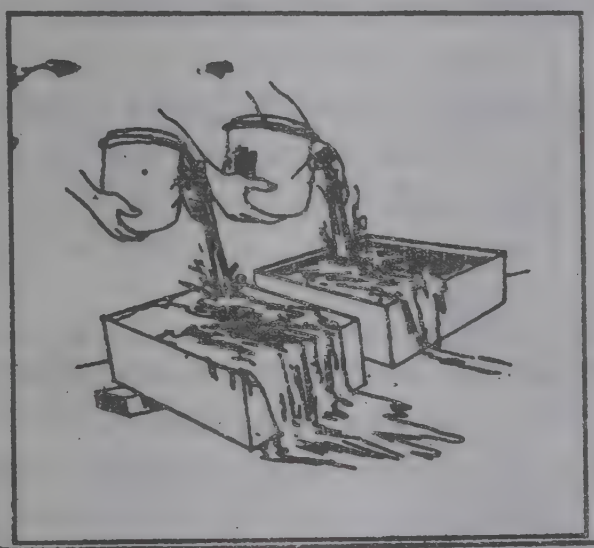
You will see a depression at that spot. The outer soil is washed away by water. You see the hard portion of earth at the bottom.

Flowing water makes the soil loose, and carries the loose soil particles with it. This wearing out of soil by the running water is called 'soil erosion'. The upper most layer of soil is very essential for growth of plants. When the flowing water carries the top soil particles, that portion of the soil erodes. The fertility of that part of the land is lost.

The soil carried by the flowing water covers the plants at the lower region. These plants also are destroyed. If the slope is very steep, the force of water will also be greater. The erosion caused is also more. Soil erosion will be greater in the regions where rivers flow.

Do it yourself:– 3.

Take two containers, cans or vessels. Fill one with clay and the other with red soil and sand. Keep the two containers in a slanting position as shown in the fig.



Take a water can with water. Pour water on both the containers with uniform force. Collect the water that comes out of these containers separately. Measure the quantity of water collected. Which is more? Why?

The soil that is carried by the running water, settles on small plants at the lower level. These plants are also destroyed. Water flows with great force in slopes.

The degree of erosion depends upon the nature of soil. Clay particles are very smooth. The particles are very close. That is why it is slippery. Crops like cotton grow in this type of soil. So this is called black cotton soil. Water does not soak more in clay soil. Most of water that falls on it, flows. Only a small part of it soaks. If clay is found in slopes, water flows very rapidly The erosion also will be greater.

Humus is very essential for the growth of plants. Soil rich in humus will be very fertile. Plants grow very well in this soil. The particles of this type of soil are not very close. The particles are held together very loosely. So when the water flows, the particles are washed away, easily

EDU-120

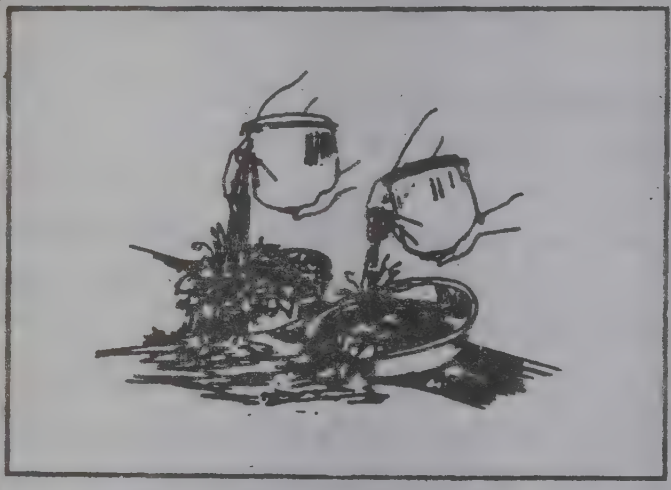
The land becomes barren. This is very dangerous. Soil erosion should be controlled. But is it possible?

It is impossible to stop the falling rain and the flowing water. But it is possible to prevent the damage caused by them.

Do it your self:– 4

Pull out some grass from a densely growing area. Let the roots be covered with soil. Dip this in water contained in a bucket. Observe the roots of grass. Has the entire soil which was sticking to the roots, gone? Observe the soil still remaining attached to the roots.

The roots of all the plants hold soil particles, as you saw in the case of grass. Where ever the plants grow closer and thick, the erosion is less there. When rain water falls on grass growing closer and thick, a large amount of water is absorbed. The amount of water, that flows over it is less. Soil erosion can be prevented by raising meadows.

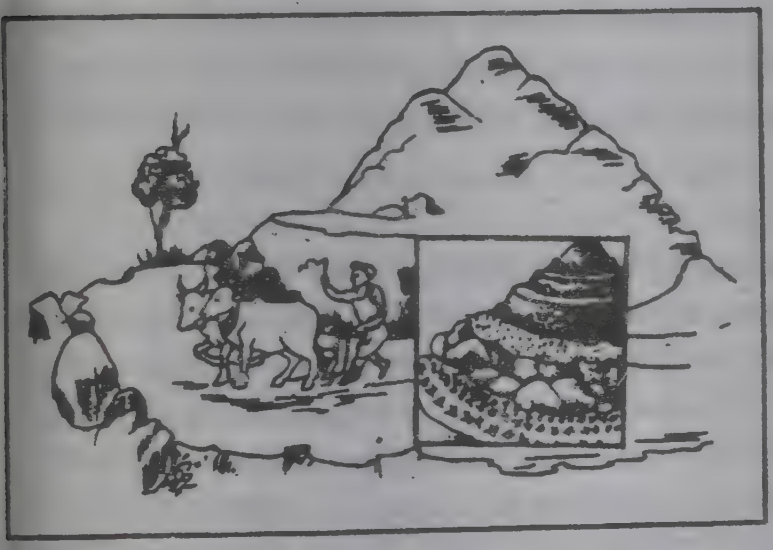


Do it yourself:– 5

Take two shallow, wide mouthed glass vessels. Fill both the vessels with the same kind of mud. Equalise the level of mud. Keep both of them in a slanting position, as shown in the figure. Spread a few leaves on one of them. Now with the help of a can pour water uniformly on both. Observe from which vessel mud comes out more.

When it rains in forest, the rain water falls on the leaves of trees with great force. Later the rain water falls on the ground. It does not directly fall on the earth. The soil absorbs water. The amount of water that flows is less. The roots of the trees make the soil porous. So water is absorbed by the ground quickly and easily, even when there is incessant rainfall, the flow of water will not be rapid. Soil erosion is less in places where there are natural forests. The soil in such areas contains organic substances. Government has taken up a number of programmes for growing forests and preservation of forest. Now you can tell the reasons for that:

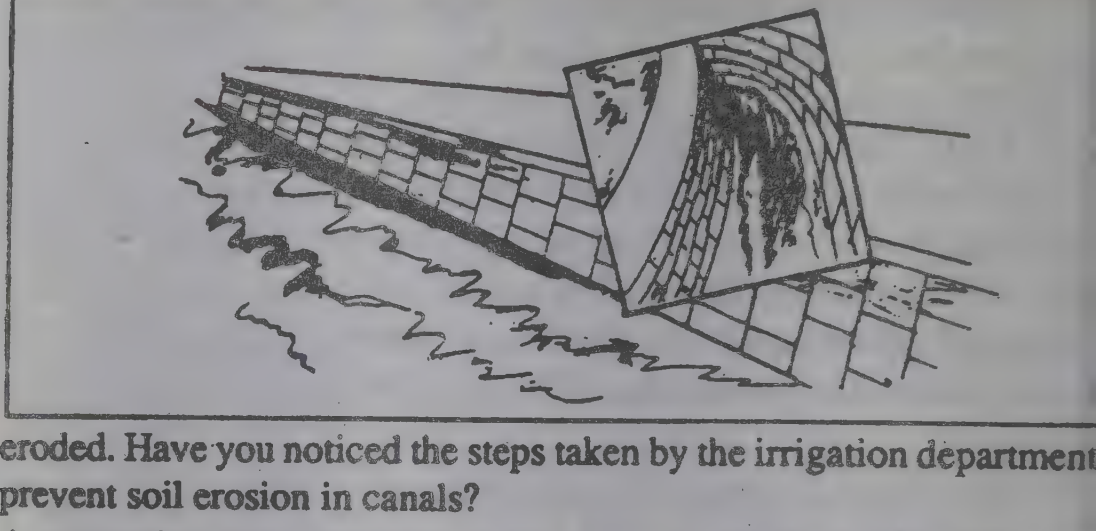
Have you seen how the lands are cultivated in hilly regions? Observe the figure below.



The slope is cut into different levels or steps. The ground is levelled at each step and then cultivated. It is called "Terrace formation". What is the advantage? This type of cultivation is called "Terrace cultivation". Each terrace is like a small tank. The bund reduces the force of water flowing down the slope. The water soak down into the soil step by step slowly. The soil erosion is reduced. The fertility of the soil is not lost.

You might have seen bunds constructed in slopes. The bunds prevent soil erosion. By building houses across the land, soil erosion can be prevented.

When the water flows in the channels, the soil on either side of the channel is gradually carried with the current. As a result of this, breaches develop in the canals. The lands on either side of the channel also gets



eroded. Have you noticed the steps taken by the irrigation department prevent soil erosion in canals?

A supporting stone structure is constructed on either side of the can This is called revetment. You see similar protection given to drains cities or towns. This kind of protection prevents erosion of soil by ra water. The water flows in the canals or drains without eroding the soil either side.

Points to remember:–

The earth surface is covered with soil. Soil is very necessary for plants. Water loosens the soil particles. The flowing water carries these particles from one place to another. As a result of this the soil is eroded. The quantity of mud transported in this way depends upon amount of rain water and its force. It also depends upon other factors like slope, nature of soil etc. Soil becomes barren as a result of erosion. Plants do not grow. This is dangerous. Soil erosion can be reduced or controlled by different methods. Government has taken up many projects for control of soil erosion.

EXERCISES

I Answer the following questions:

(i) What is meant by sedimentation?

(ii) What is erosion of soil?

(iii) How does water transport soil particles from one place another?

(iv) What are the factors responsible for soil erosion by water?

(v) What are the harms caused by soil erosion?
(vi) What is meant by "Terrace Cultivation?"
(vii) What are the advantages of "Terrace Cultivation"?
(viii) What measures can be undertaken to prevent erosion of soil by water?

II Below are given a few incomplete statements. Below each such statement four words are given. Select the most appropriate word and fill in the blanks.

1. If the particles of soil are closely held together, it is.....
(sand, clay, humus, red soil)
2. One of the most important reasons for growing forests is.....
(to destroy wild animals, to remove the silt, not being able to cultivate, to prevent erosion of soil)

III Give reasons for the following:

1. During rainy seasons, the colour of water in rivers looks like the colour of soil in the neighbourhood.
2. Silt is removed from the tanks now and then
3. In places where grass grows, the erosion of soil will be less.
4. On either side of drains stone revetment with cement or mortar is seen.

IV *Do this also:–*

1. You might have heard of landslides on the slopes in hilly areas. Cars, motors and other vehicles cannot move as the roads are covered with rocks, soil etc., as a result of land slide. What are the reasons for this? Collect information and pictures of landslides from papers.
2. The depth of water reservoirs like K.R. Sagar, Bhadra, Tungabhadra, Alamatti etc goes on decreasing year after year.
Discuss in your class:-
(i) The reasons for a situation like that.
(ii) Causes for this and.
(iii) Remedies.
Take the help of your class teacher.

11. SOIL EROSION AND CONSERVATION

Part – II

Erosion of Soil by Wind:–

Wind, like water, is also a medium in soil erosion. Wind transports soil particles from one place to another.

On a windy day if you happen to walk on the road, you might have experienced particles of soil hitting your face. Particles of sand enter in between your hairs. Where do these particles come from?

Do it yourself:–1.

Take a small quantity of mud on the road. Spread it on a table. Note the quantity of mud. Take a fan and fan the mud. After a few minutes note the change in the quantity of mud. Take care that the sand particles does not fall into the eyes of classmates.

Do it yourself:–2.

Spread some sand on the table as you did in the previous activity. Sprinkle some water on it. Fan it as you did previously. How much of mud is transported? Compare with the previous activity. Note the difference.

What do you understand from the above activity? If the surface of the earth is dry, the wind can erode it easily, when the earth surface is wet, the erosion is less.

The erosion of soil depends upon the speed of the wind. This has also come to our experience. In order to prove it, conduct an activity. Note the quantity of dry sand scattering. Now fan very fast. Note the difference. What do you conclude from the above activity?

You might have experienced a whirlwind. The wind blows with great speed. The whirlwind carries not only the soil particles, but also other things in that area. Talkad is a famous pilgrim centre in Mysore

district. It is on the bank of the river Cauvery. Here you can see heaps of sand. The wind carries sand and settles on the neighbouring temples. The temples are actually covered by sand. The sand is removed now and then to make way to the temples.

In deserts as the wind blows, the heaps of sand sometimes disappear. Sometimes new heaps of sand are formed.

You have learnt in the previous lesson that the erosion of soil, depends upon the type of soil. In the case of clay, the particles are very close. So erosion is less in the case of clay soil.

Can we stop the wind? No. But we can reduce the havoc or danger caused by the wind. The measures taken to prevent erosion of soil by water may be undertaken here also. The land where the plants do not grow is generally dry. Water content is very less. The speed of wind is greater in such areas. Wind carries the particles of soil easily in such places. Forests play a very important role in prevention of soil erosion. The roots of the trees growing in forests go deep in the soil and hold the soil particles together. The wind cannot carry the particles of sand easily. This is one of the many advantages of forests. At least by growing grass(turf) on land, the soil erosion can be reduced.

Population explosion is mainly responsible for deforestation. This in turn is responsible for soil erosion. How is population explosion related to soil erosion? Discuss this with your teacher.

Points to remember:–

Wind like water is an agent of soil erosion. The erosion caused by wind depends upon (i) the surface of land (ii) type of soil (iii) the speed of wind. Planting trees in forests, (afforestation) their protection and care are very important measures to reduce soil erosion. So preservation of forests is of vital importance.

EXERCISES

I Answer the following questions:

(i) How do you show that wind is an agent of soil erosion?

(ii) What factors determine the erosion of soil by wind?

(iii) What are the steps taken to reduce the erosion of soil by wind?

II Give reasons:

(i) You find particles of dust on the same floor the next day after sweeping.

(ii) soil erosion is greater in drylands.

(iii) soil erosion is greater in forest areas.

(iv) Heaps of sand sometimes disappear in deserts.

(v) Some temples at Talkad are covered by sand.

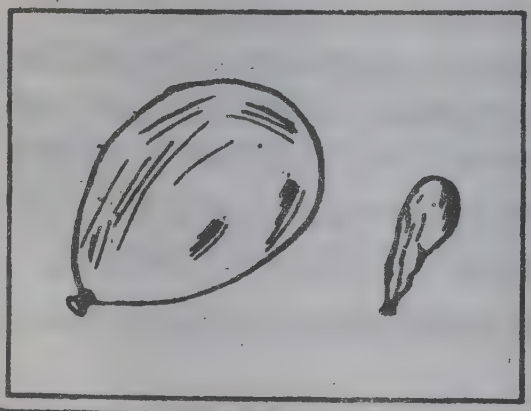
12. AIR AND ITS USES

Air is one of the things which is essential for us. It spreads around the earth to a height of about 300 kilometres. No living being can live without air. Air is not visible to the eye but we feel the experience when it blows. Air is necessary for respiration and combustion. Air helps the wheels of motor cars and other vehicles to move easily.

What are the important properties of air?

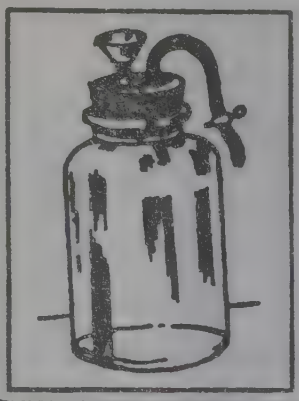
Do it yourself:–

Take a rubber balloon, fill it with air. What change takesplace in its shape and volume?



Sqeeze the swollen balloon. What is the change in shape and volume?

Do it yourself:–



Take a glass bottle as shown in the figure. Close its mouth by a two holed cork. Insert a funnel through one of the holes. Through the other hole insert a glass tube having a rubber tube. Fix a clip to the rubber tube - pour water into the funnel. Does water flow into the bottle? Now loosen the clip what happens to the water in the funnel?

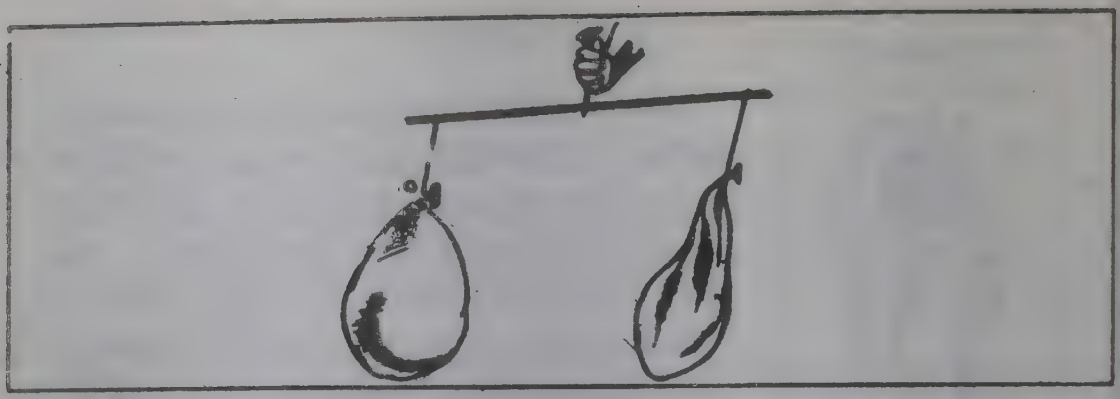
When the balloon is filled with air its volume increases. When it is squeezed its volume decreases. The bottle is full of air. So water in the funnel does not flow into the bottle. When the clip is loosened the air in the bottle goes out. So water flows into the bottle. As the bottle is filled with air.

Water has place to get into it. It can get into the bottle only when the air leaves some space. From these two experiments we can understand that air occupies space.

Do it yourself:–

Take a thin stick of one metre length. Take two empty balloons of same shape and weight. Fasten one balloon to each end of the stick. Tie a small piece of thread at the middle of the stick. Hang the stick by the thread, parallel to the ground. Take out one of the balloons and fill it with air. Afterwards tie it to the same end of the stick once again. Examine the stick. Is the air filled balloon heavier or lighter than the empty balloon? How do you confirm this?

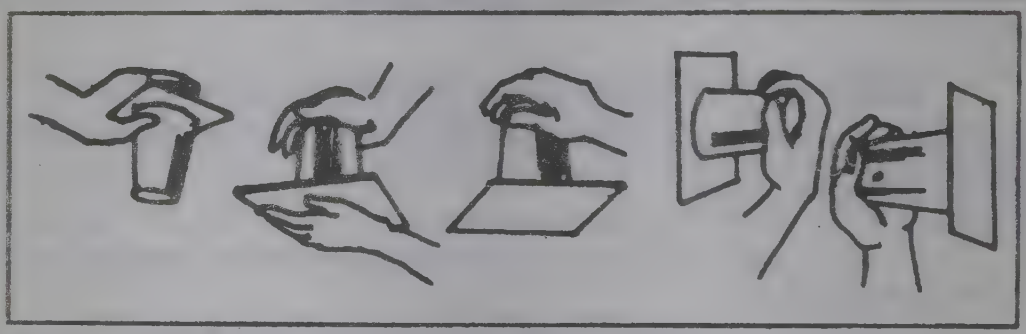
The stick was Parallel to the ground when empty balloons were fastened to both ends of the stick. But when there is air filled balloon on



one side of the stick, that particular end leans towards the ground. Air filled balloon is heavier than the empty balloon.

From this experiment we can understand that air has weight.

Air occupies space and it has weight. Just like solids and liquids air is also a sort of matter. Air has volume, weight and also pressure

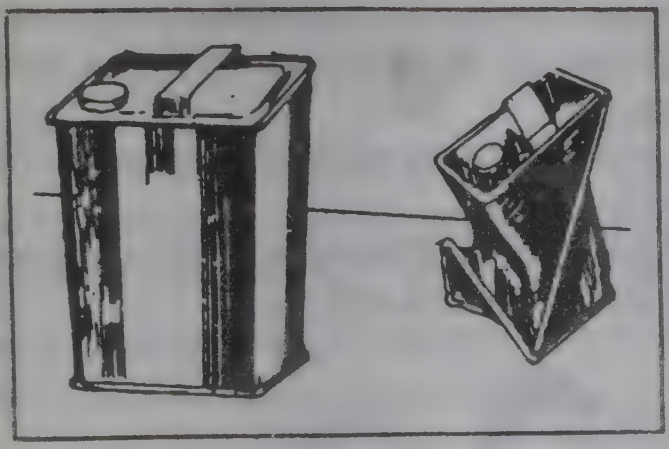


Do it yourself:–

Take a glass tumbler. Fill it ompletely with water. Place a thin piece of paper on it. Some water may come out at the sides. Keep one of your hands on the paper as shown in the figure and invert the tumbler with the help of the other hand. You will see that water in the tumbler does not fall down. You may wonder at this. Now keep the tumbler side wards as shown in the figure. Observe that water in the tumbler does not comeout. Even, when the tumbler is inverted water does not fall down because, air below the paper pushes it upwards. This balances the weight of water. So we can understand that air has upward pressure.

So we can understand that air has side ward pressure also.

Do it yourself:-

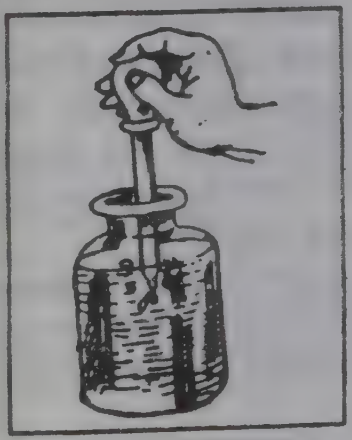


Take a tin having a tight lid. Take a small quantity of water in the tin and heat it vigorously. Stop heating when steam comes out of tin, and tie the lid tightly. Take out the tin and pour cold water over it. Observe the shape of the tin. What change do you observe in its shape?

Immediately when cold water is poured over the tin, its shape alters because when the tin is heated water in it becomes steam. When the lid is fixed and cold water is poured over it, the remaining steam in it is cooled down and converted into water. Partial vacuum is created in the tin. Air around the tin presses it in all directions. The air pressure in the tin is very low. So it squeezes itself and loses its shape.

From this we can understand that air exerts pressure in all directions, our body does not lose shape like the tin, what might be the reason?

The air inside our body, balances the air pressure outside. That is why the body does not lose shape.



Do it yourself:-

Take an ink filler and dip it in the ink bottle. Observe whether the ink rises in it or not. Press the bulb of the ink filler. Observe air bubbles coming out through the ink. When we stop pressing the bulb regains the original shape and ink rises in the tube.

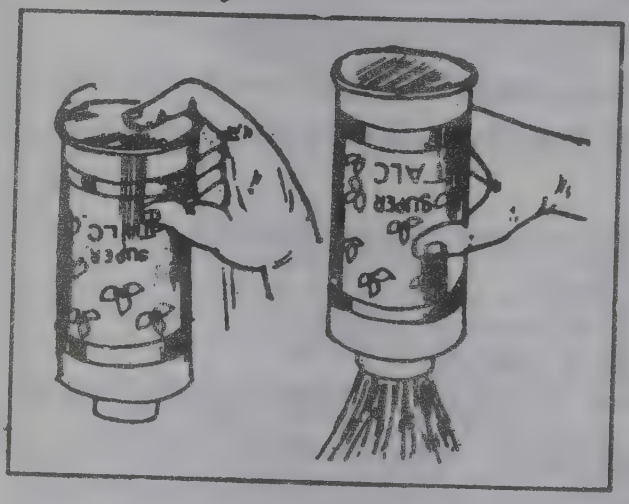
What might be the reason?

When we stop squeezing air pressure inside the tube becomes le than the atmospheric pressure. Then the outside pressure pushes ink in the tube. This action continues till the air pressure outside it becom equal to air pressure inside it.

You might have used small tubes while drinking cooldrinks juice from a tender coconut.

In the following figure a child is drawing liquid through the tub How does the liquid flow from bottom to top?

Do it yourself:–



Take an empty tin. Bore four small holes at the top of it. Bore another hole at the bottom of it. Invert the tin and immerse in the water. Water fills in the tin. Take out the tin from the water. Water in the tin comes out through the holes. Close the single hole which is above by means of a finger. Flow of water in the holes stop. Why?

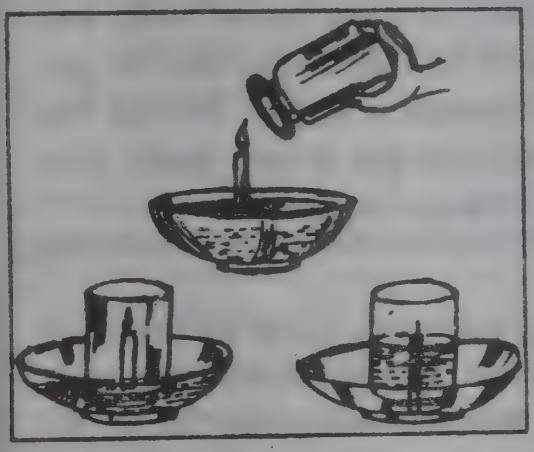
Air has upward pressure. This stops water flowing from the holes. When the finger is taken out air gets in to the tin through the hole and exerts downward pressure on the water. Then the water flows out through the lower holes.

Constituents of air:-

You have already learnt that air is necessary for the respiration of living beings. We can live for some days without food. We can live for some hours without water. But we can't live without air even for a few minutes.

Air is a mixture of several gases. Nitrogen oxygen, carbon dioxide, water vapour and other gases are present in air. We shall examine the proportion in which they are present in air.

Do it yourself:-



Take a wide glass vessel keep a burning candle at the centre of the vessel as shown in the figure. Pour water into the vessel. So that water level is below the flame. Invert a big glass bell jar over the flame. Immediately note down the level of water. You will see the candle burning. The flame diminishes gradually and vanishes at the end. What might be the reason? Has the candle used all the air inside the vessel?

Some air is left inside the vessel. It cannot go out when the candle was buring. A part of the air in the vessel helped the candle to burn. After this part of the air was fully utilised its space was occupied by the water. It will be noticed that water has rised in the jar to about 1/5 part of it. This means that a gas equivalent to only 1/5 part of the air supports burning. The scientists Priestly and Schele first observed this. The scientist by name Lavoisier called the gas oxygen.

You saw that flame was put out after the oxygen in the jar was completely used. You also saw that water did not fill the jar completely.

So we can learn that while one part of the air supports burning, the other part does not. The remaining part of air in the jar is called nitrogen.

Nitrogen and oxygen are the main constituents of air.

Apart from nitrogen and oxygen what other gases are present in the air?

Do it yourself:-

Take a glass vessel. Pour a little quantity of clear lime water in it and place it in air. Observe its colour. Keep it in air for 15-20 minutes. What change in colour do you find in the lime water?

We observe that the clear lime water has turned milky and a white layer is formed on the top of it. This means that the gas which can turn lime water milky is present in the air. We call this gas Carbon dioxide. The quantity of this gas is very small. One hundred parts of air contains only 0.04 part of the gas.

Do it yourself:-

Put some pieces of ice in a glass vessel. Close the mouth of the vessel and keep it in air. After a few minutes examine the outer wall of the vessel. You will find the outer walls dim due to the presence of mist. Wipe out by means of your fingers. Water sticks to the finger.

Where did the water come from?

There is water vapour present in the air around the vessel. When water vapour is cooled by the cold vessel, it deposits on the outer wall of the vessel.

Apart from these, particles of dust and some rare gases are also present in the air in very small proportions.

The main constituents of air are as follows :

Constitutents of air	Quantity–percent
1) Nitrogen	78.00
2) Oxygen	21.00
3) Carbon dioxide	0.04
4) Water vapour, particles of dust and rare gases.	0.96
Total	100.00

The oxygen obtained by animals through respiration participate in the slow combustion of food. Energy is liberated from the reaction. This energy helps us to do work. During this action carbon dioxide will be liberated.

Necessity of oxygen occures for the mountain climbers and Sea divers. These people take oxygen filled cylinders with them. People who have breathing trouble should be supplied with oxygen at times of necessity. So oxygen filled cylinders are always kept ready in hospitals.

Carbon dioxide is necessary for plants to prepare their food. Plants use carbon dioxide, liberated during the respiration of animals.

Nitrogen is used in the manufacture of artificial manures and to fill up electric bulbs.

There is water vapour in the atmosphere. When this is cooled it is converted into water. This water falls down on the earth in the form of rain.

Remember:–

There is atmosphere in the space around the earth. Air is spread over this space. Air has definite weight. It exerts pressure. Air pressure makes things move. Though air is present around us we do not experience it. Air is a mixture of several gases. Nitrogen and oxygen are in large proportions. Oxygen is necessary for combustion and respiration.

EXERCISES

I Answer the following.

1) How do you show that air has pressure?
2) How does ink enter an ink filler?
3) How do you show that air has weight?
4) Name the main constituents of air.
5) Mention two uses of each of the following gasses- Oxygen, Nitrogen, and Carbon dioxide.

II Fill up the blanks:-

1) _____ gas turn clear lime water to milky.
2) 78% of the air is _____ gas.
3) Divers in water take _____ gas cylinders with them.
4) _____ gas is essential for respiration.
5) Plants prepare their food from _____ gas.
6) _____ gas is used in artificial manures.

III Costituents of air are given in list A and their uses in list B. Match them correctly :

List A	**List B**
Constituents of air	Uses
1) Oxygen	(a) Bring rain.
2) Nitrogen	(b) Manufacture of artificial manures.
3) Carbon dioxide	(c) for the respiration of animals.
4) Water vapour	(d) for the preparation of food by the plants.

Do this also:-

Put a paper ball in to a gas jar and push it downwards. Adjust it in such a way that the paper ball does not fall down even when the jar is inverted. Invert the jar and immerse it in a bucket of water.

Take the jar out of the bucket without shaking it touch and feel the paper.

It will not be wet. Why?

13. ENVIRONMENT AND POLLUTION

You are already familiar with the word environment. We say that the environment on the bank of a river is very calm. We know that the environment in busy and crowded areas is not good. The condition and surroundings of home, school, office and the relationship with the men and material there is environment. Standing on earth, when we look around, we see plants, animals, rivers, hills etc. Environment includes all these.

Environment is broadly divided into two categories - one is organic and the other is inorganic environment. Plants, animals, insects, and other living beings belong to organic environment. Air, water, rocks earth which are non-living belong to inorganic environment. All living beings depend upon nonliving things for their survival. They are interdependent. Man is an important factor in the environment. Man also belongs to animal kingdom. Among all other animals, man is using the environment to the maximum extent. As a result of this, many of the activities of man have proved harmful to nature. While man uses air, water and other resources of nature, he pollutes it also. Thus the environment gets polluted.

Nearly 70% of water found in rivers, tanks and ponds is polluted. The food that we eat lacks proper nutrition. By using such water, food and air, for every three minutes, a child dies. Every year nearly 10 lakh hectares of forest is destroyed. This results in famine. We worship rivers. But we throw waste materials into it. This is the grave situation in our country. It is not too late. Even now we can improve the situation. To make this a reality, proper awareness of causes of pollution has to be created among people.

Earth is surrounded by a thick layer of gases called the atmosphere. The air present in the atmosphere contains oxygen. This is essential for life. If the atmosphere is polluted, our life will be in danger. So we must try to keep the atmosphere around us pure and clean.

We burn fuel at home for cooking. We burn coal in factories. Petrol or diesel is burnt as a result of combustion in vehicles. As a result

of all these combustion, corbon-di-oxide and carbon monoxide gases enter the atmosphere. Thus air gets polluted.

As a result of industrial revolution, a number of industries have come up. The smoke that comes out of the chimney of these factories contain a large quantity of carbon monoxide, oxides of sulphur and nitrogen etc. These are poisonous. When these gases enter the atmosphere, the air gets polluted. People living in industrial areas, suffer from lung diseases like tuberculosis, asthma etc. Some of them suffer from skin diseases, anaemia, ear and eye diseases also.

In rural parts wood, cowdung, leaves, barks of trees are used as fuel. There is no proper ventilation in houses. The poisonous gases produced while burning, cannot go out easily. So when men, women and children at home breathe this air, they become victims of a number of lung diseases.

When we think of air pollution, we get the mental picture of factories with tall chimneys and thick smoke that comes out of it. Equally dangerous are the crores of people who smoke cigarettes, beedies etc. You need not smoke. To be near them is enough. The smoke enters our body, we get a number of lung diseases. The most dangerous is lung cancer.

Peepul trees are very common in villages. Scientists have investigated the advantages of peepul trees. Peepul tree absorbs a large quantity of carbondioxide and gives out equal amount of oxygen. So we have to grow more peepul trees and take care to protect them.

Some children are fond of cutting down branches of trees and disfigure them. We must show interest in growing plants but not in cutting down trees. It is true that the space available in cities is very less. We can think of growing plants, that occupy less space. We can grow some twiners or runners that spreads on our roofs. We can also grow plants in empty tins, pots and bottles. Horticultural department will supply saplings free. You can grow plants in your school premises. The saplings that you plant now will grow into big trees later. These trees are useful to the school

and also to the community. The programme of tree planting is in full swing in our state now.

By economical use and reuse, we can control air pollution. For example we must use light only when it is necessary. Thus we can save electricity. If the demand for electricity increases, more and more forests are destroyed. Air pollution increases. Life of a tree gets extension by putting out a light.

'One house - Two trees' - remember this slogan.

Environment and pollution

Things to remember:–

1. Environment includes all that we see around us.
2. Two types of environment: organic and inorganic. (living & nonliving).
3. Man is also an important component of environment. Because of the excessive use of the environment for his comforts, there is an imbalance in nature.
4. As a result of the extraordinary intelligence of man, a new civilization is formed. This has resulted in pollution.
5. Industrial revolution, use of automobiles, destruction of forests and killing of wild animals have resulted in imbalance.
6. Air pollution, water pollution and sound pollution are the most important.
7. Several measures have to be taken to prevent environmental pollution - economy in use of fuel, reformation in industrial development and restoration of forest wealth are some of the urgent things to be attended to.

EXERCISES

1. What is meant by environment?
2. Explain the meaning of pollution of environment?
3. How many types of environment are there?
4. What is air pollution?
5. Mention the causes for air pollution?
6. How can air pollution be prevented?
7. What measures can we take to keep the atmospheric air pure?
8. What is the importance of peepul tree with regard to environment pollution?

14. FORCE, WORK AND ENERGY.

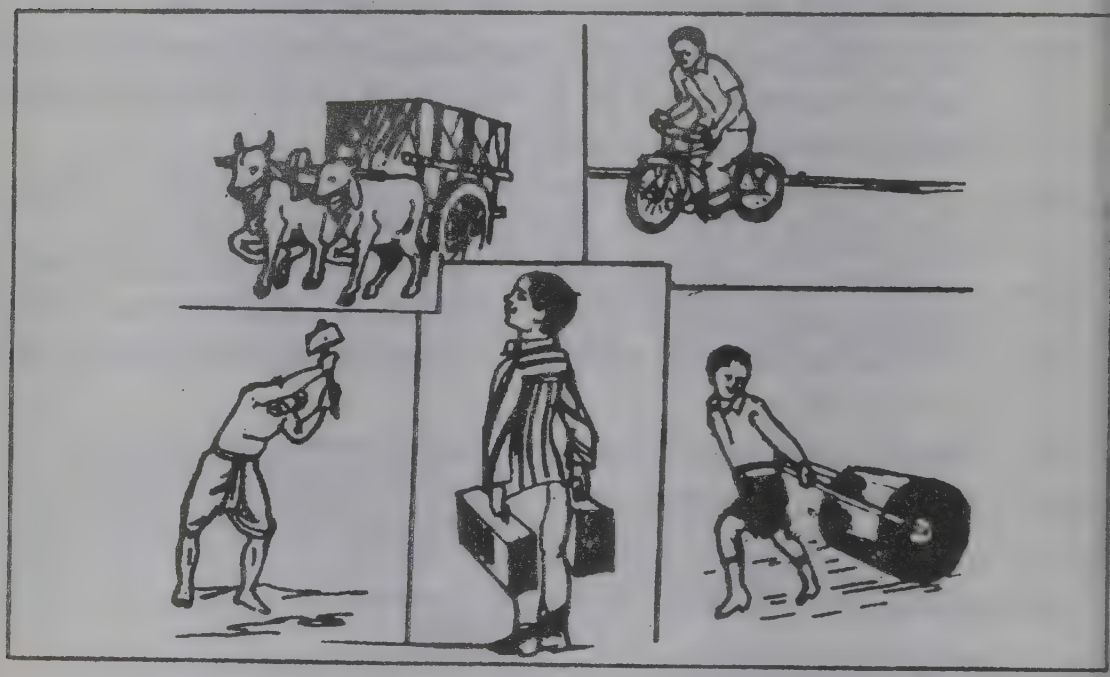
You know that force is required to lift an object on the floor. Force is needed to make stationary things move. Force is necessary to change the direction of things in motion or to stop a moving object.

What is force?

Force is that which causes the object at rest to move or brings a moving body to rest or changes the direction or velocity of a moving body.

What are the sources of force?

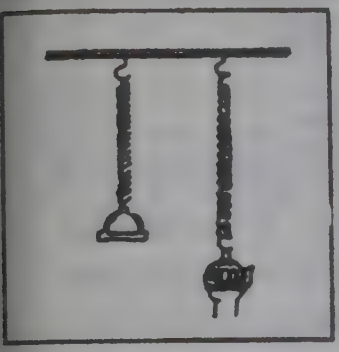
Observe the pictures given below, what do you understand?



For drawing a heavy cart, the muscle power of animals is used. Muscle power of animals is greater than that of human beings. While riding a cycle, the muscle of the leg is useful. While digging the ground or pulling a roller, the muscles of the arms are helpful. What do you understand from these examples.? Muscles are the sources of force. We can push a heavy table or a stone, using our muscle power. All these examples show that the muscles produce force.

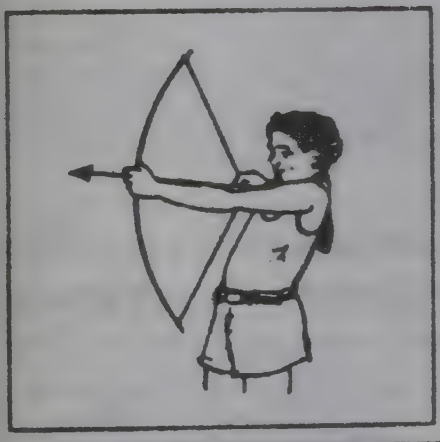
Do it yourself:- 1

Take a spring pull it. It becomes longer. When force is released it goes back.



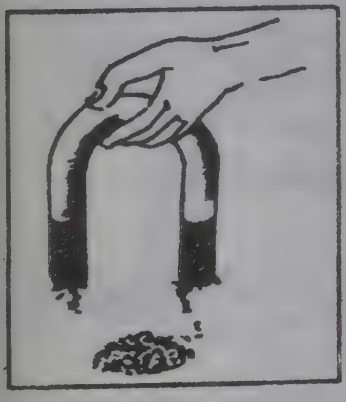
Push a spring door and leave it. It closes itself. The expanded spring or rubber, uses the force as long as it is expanded. When the force is released it causes movement.

Do it yourself:- 2



Make a bow out of a bamboo stick. Shoot an arrow using this bow. The arrow moves forward. Why? Afterwards the bow regains its previous shape. Why? The bow applies its force on the arrow, when the arrow is released. The force causes its movement.

Do it yourself:- 3



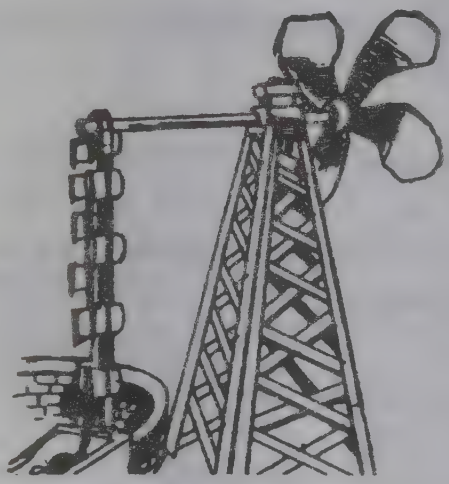
Take a magnet. Roll it in iron filings. Then take it out. You observe that iron filings stick to the magnet. Magnet attracts iron filings.towards it. This force is called "magnetic force". To lift heavy machines powerful magnets are used. So magnet is also a source of force.

Do it yourself:- 4

Take a plastic comb. Using it comb the dry hairs. Bring small pieces of paper near the comb. You will see that the pieces of paper are attracted towards the comb. It is the static electricity that attracts the paper pieces. Electricity is one of the sources of energy. Fan, electric bulb, water lifting pumps and many other machines work using electricity.

Waterfalls are big sources of force. Electricity is produced here. Steam makes the railway engine move. Water and steam are also sources of force.

Observe the wind mill. It has blades like the blades of a fan. When the wind blows , the blades move and wind mill rotates. The belt attached to the wheel also rotates. When the wheel rotates, water in the well is lifted.



This is used in the field of agriculture.

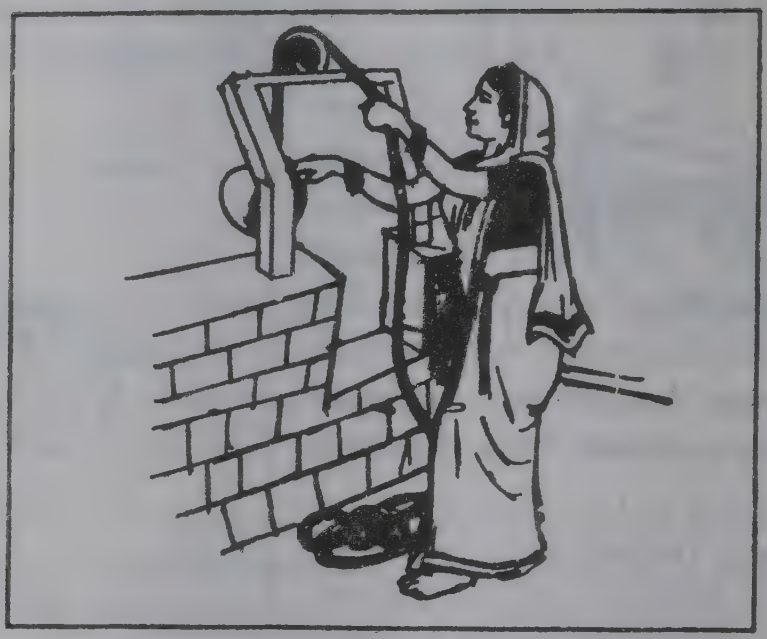
Observe the figures given below.

The carpenter is driving a nail using a hammer. Hammer has weight, the muscle force of the carpenter and the weight of the hammer help in driving the nail into the wood. The stone breaker using a big hammer breaks big stones. Can we break a big stone using carpenter's hammer.? You have seen road rollers used in the construction or repairs of roads. The road roller has heavy huge iron roller. When it moves, the sand and the gravel is pressed. So weight is also a source of energy. Can you say how ?

You have seen the fruits falling from the tree to the earth. It will not go up. The earth attracts all the substances towards its centre. This force is called gravitational force. This force that is exerted on all the things on the earth is called weight. It was Newton who gave a clear idea about gravitational force and weight.

Work:-

Observe the pictures below:



You see in this picture a lady drawing water from a well, a coolie carrying luggage on his head and a person pushing a cart. What are all these people doing?

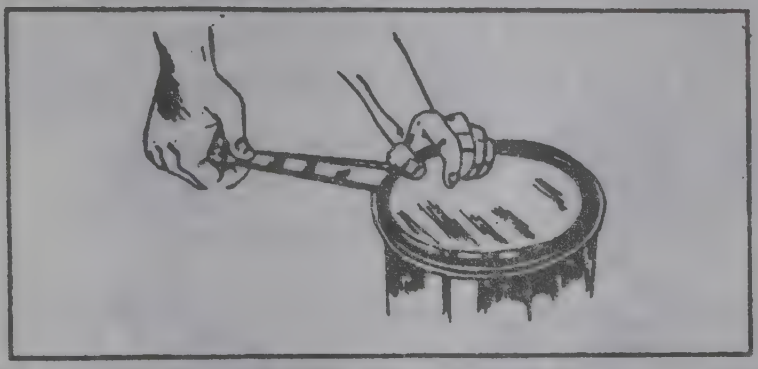
Force is necessary to do work. What is the source of energy in all these examples.? Muscle force is the source in all these three cases. In the above picture a person is pushing a cart with a heavy load. The object is transferred from one place to the other.

Simple Machines:-

Machines play a very important role in our life. Machines help to make work easier. You have observed people using different kinds of machines for getting their work done. Force is necessary to do every work. A machine is a tool or a device which by applying force makes work easier. A simple machine is one which has a very simple structure.

Do it yourself:-5

You are given a tin. The lid is very tight. Try to remove the lid using the nails of your fingers. If you cannot remove it, what do you propose to do now to open the lid?



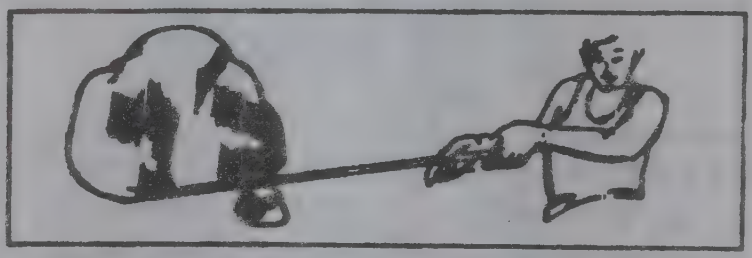
Take a spoon, keep the hind portion of the spoon, between the lid and the tin, as shown in the fig 11 and lift it. The lid opens quickly. Here the spoon helps to open the lid. This is a simple machine. Such a simple machine is called a lever.

Observe the following fig.

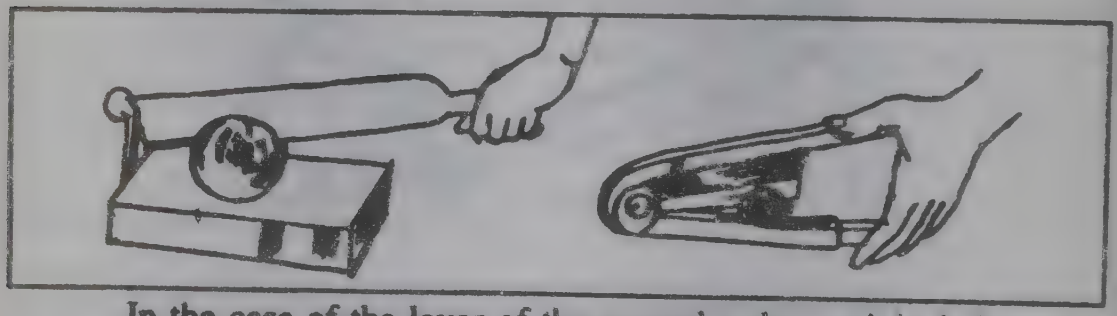
Take a strong iron rod. push it under the boulder as shown in the figure. Place a small stone below the rod. Press the free end of the rod downwards. Observe what happens now. The rod has made the work easy. Rod has worked like a simple machine. This simple machine is called a lever. The lever is a long rod. Force is applied at one end in the direction we want. This results in work. Let us understand the parts of the

simple machine- Lever: the force applied at the free end of the rod. The small stone which provides rest to the rod is called the fulcrum. The force that helps to lift the heavy stone is called the effort. The opposing side is called resistance. The distance between the fulcrum and the weight is called the weight arm. Similarly the distance between the fulcrum and the effort is called effort arm. Depending on the position of weight, effort and fulcrum, the levers are classified under three groups.

In the lever of the first order the fulcrum is in between weight and effort.



If the effort arm is longer than the weight arm heavy weight can be lifted easily. Scissors, balance, the spoon used to remove the lid are the levers of the first order. Have you examined the scissors used to cut paper or tin? What is the ratio between the weight arm and the effort arm in this case? In the case of scissors effort arm is longer than weight arm. That is why it is possible to cut hard tin sheet easily using scissors.



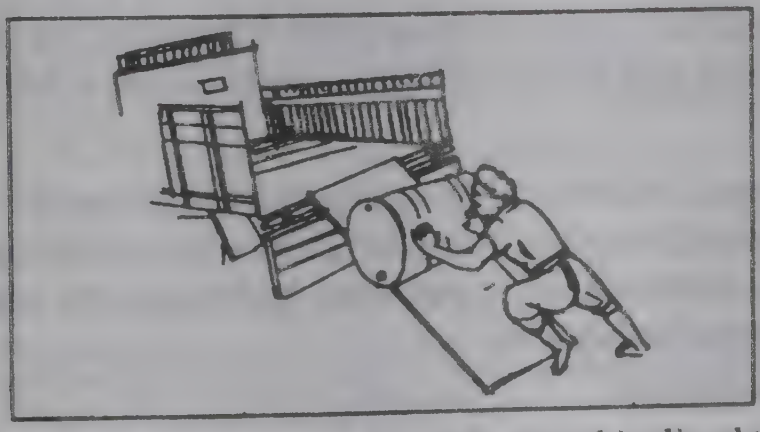
In the case of the lever of the second order, weight is between fulcrum and effort. Examine the figure of a nut-cracker find out the position of weight, fulcrum and effort (power). Weight is in between the fulcrum and effort (power). Measure the weight arm and the power arm. Power arm will always be greater than the weight arm. So we can cut the hard nut by using a little power.

In the case of the lever of the third order, power will be in between the weight and the fulcrum. Power arm will always be smaller than the weight arm. So we have to use greater power to lift a small and light material.

Such levers are used to lift a piece of burning charcoal, to lift the weights from a weight box. Forceps is a lever of this group. A knife used to cut a piece of bread and the fore arm carrying a weight also belong to this group.

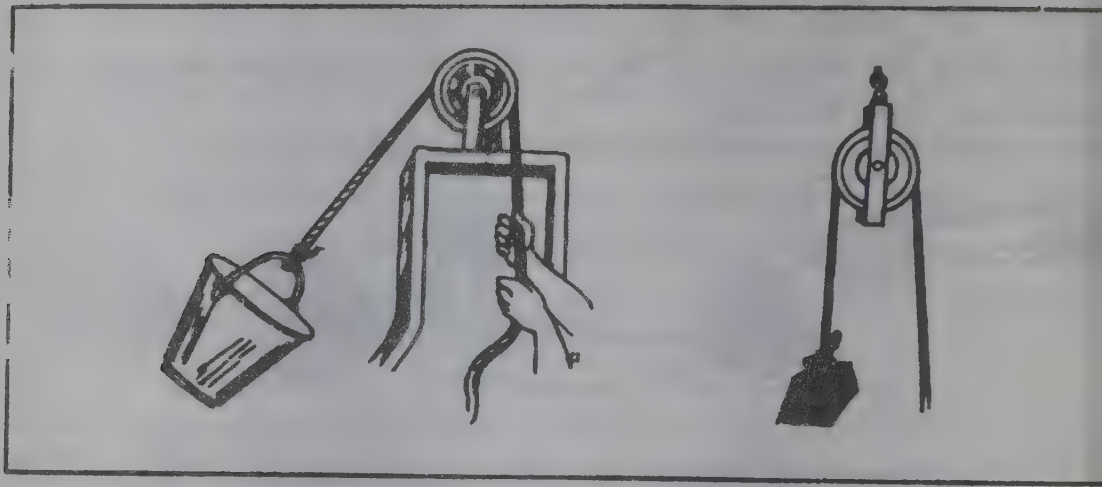
Inclined Plane:-

There is a heavy drum we have to place it on a truck. We cannot lift it because it is very heavy. Then, how can we transfer this to the truck.?



Look at the fig. A wooden board is placed inclined to the truck. We can transfer the drum on to truck by rolling the drum on the wooden board. The inclined board also works like a simple machine. We call this an "inclined plane". The footsteps to climb the upstair is also an inclined plane. You might have seen the inclination between the footsteps. It is used to take scooters and cycles into the house.

Pulleys:–



You might have seen the pulleys used to draw a water fill bucket from a well. pulley is also a simple machine. This is a wheel havi a grove all around. This is fixed to a support. A rope is passed through t grove. A bucket is tied to the end of the rope and it is run into the we When the bucket is filled with water the other end of the rope is drawn applying force on it. The pulley rotates on the axis. It changes t direction of the force. Thus the pulley helps to do the work easily.

The screw is also an inclined plane. It is used to join the material You might have seen the screws used to join the window and the shutter

Energy:–

Energy is required by the people, the animals and the machines t do work. People get energy from food. Food is the source of energy eve for animals. Water-energy is produced by the flowing water. We g energy from various sources.

Do it yourself:-6

Put a small quantity of water in an iron tube closed at one end. Close the mouth of the tube firmly by means of a cork. When the tube is heated by means of a spirit lamp, the cork burst out. What made the cork bursts out? The steam in the tube exerted pressure on the cork. The steam has done work by moving the cork to some distance. Heat converts water into steam. Steam exerted pressure on the cork and did work. In this situation heat is the source of energy.

From this experiment we understand that

"Energy is the capacity to do work."

There are various sources of energy. We get energy from muscles, ivers (or electricity). From where do these sources of energy get timulation for their continuous action? A steam engine gets its energy rom steam. Steam gets its energy from burning charcoal. Charcoal was ormed by trees which lived crores of years ago. These got their energy rom the sun.

What are the other sources of energy.?

Do it yourself:-7

You might have seen an electric fan. The fan rotates when the switch is turned on, which is the source of energy that rotated the fan? Electricity is the source of energy to rotate the fan. Electricity is used to work pumps and flour mills. We use this to provide light and heat in our houses. Electricity is also used to run machines in factories.

Do it yourself:-8

Take a soft iron piece. Wind round several turns of insulated copper wire on it as shown in the figure. Connect these ends of this wire to the terminals of a battery through a switch. Put on the switch. Electricity flows through the wire When iron filings are brought near the iron piece it attracts the iron filings. Why? The iron piece has accquired magnetic energy. Cut off the electric current. What happens now? It has lost its magnetic energy. Iron filings drops down. Which is the source for magnetic energy? Electric energy is the source of magnetic energy.

Which is the source of energy for heat and light? We obtain both heat and light from the sun. We obtain heat and light when wood, coal, charcoal and kerosene oil are burnt. All sources of heat are source of energy. Heat is a form of energy. Light is also a form of energy.

Do it yourself:-9

Rub your hands vigorously. What do you experience? Take two pieces of stone and rub them against each other. What do you experience, when you touch them immediately? Heat is produced by rubbing two hands or two stones against each other vigorously.

These are the important sources of heat–

(1) Sun (2) Water (3) Food (4) Air (5) Fuel

(6) Chemical reactions (7) Electricity

Sun is the main source of energy. The sun gives us heat and light. The energy got from the sun is called "solar-energy." Plants prepare their food from the solar energy. We use solar energy directly by getting heat by the use of solar ovens.

Water is another important source of energy. Water is stored in reservoirs by building dams. This water is made to flow with great pressure. Electricity is produced by working generators by means of the water pressure.

Wind is a source of energy. We can lift water from the wells by using wind mills.

The engines used in lorry, bus, car, aeroplane, scooter and such other vehicles work by getting energy from petrol.

Energy is liberated when chemical reaction takes place between two elements or compounds. Heat and electric energy are produced from this chemical action. Dry cell is a device which provides electricity by means of chemical action. Electric energy is converted into mechanical energy, light energy, sound energy and heat energy. The chemical reactions that take place, when we take food is the basis for the growth and energy produced in our body.

Saving and Limited use of Fuel:-

We use wood, kerosene oil and cooking gas as fuel in houses to cook food. These fuels are very valuable. We have to limit their uses and we should not waste them.

(1) When we have to cook food, we should keep everything ready before lighting the stove.

(2) If we use the vessels closed with lids for baking vessels, the food will be baked quickly.

(3) We should use limited quantity of water to bake the food.

(4) It is better to use "pressure cookers" for cooking purposes.

Electricity is used to run various types of machines. Electricity is useful for obtaining heat and light. Coal is used to produce electricity. We can save the coal by using electricity.

(1) We should cultivate the habit of putting off light and fans before leaving the room.

(2) We should put off the switches of radio and T.V. when there is no body in the room.

We can save wood, coal, cooking gas and kerosene oil by using gobargas and solar ovens.

Remember:–

Force produces motion in an object at rest Increases or the decreases the speed of moving objects. Changes the direction of moving object or changes the shape of an object if it is soft.

Sources of force:-

Muscle power, mechanical power, accleration due to gravity, magnetic power and electric power.

If an object moves on account of the force, we say that work is done. Energy is essential to do work. Our work becomes easy by the use simple machines. Machine is a device which helps us to do work by very small force.

Force, Work and Energy

Things to remember :- **Levers, pulleys, wheels, scews inclined planes are all simple machines. We can lift heavy objects easily with the help of levers. We can transfer heavy objects by means of inclined plane. We can transfer heavy objects from one place to another by means of wheels. There are three types of levers. The capacity to do work is called energy. Sun, water, air, chemical reaction, electricity, fuel are all different sources of energy. We can convert one form of energy into another.**

EXERCISES

I. Answer the following questions :

(1) What is force?

(2) Which are the sources of force?

(3) What is work?

(4) What is a simple machine?

(5) Name the different kinds of simple machines?

(6) What is a lever?

(7) How many types of levers are there? Give two examples for each type of lever.

(8) How can you lift a heavy material by means of an inclined plane?

(9) Which simple machine do you use to lift water from the well?

(10) Name two levers where fulcrum is in between the weight and the power.

(11) Classify the following under three types of levers. Knife used to cut bread, scissors, nut cracker, common balance, tow of a boat, forceps.

(12) What is energy?

(13) Name four sources of energy.

(14) Name the divice to convert chemical energy into electrical energy.

(15) Mention two uses of solar energy.

(16) Mention two ways of saving electricity.

II. Fill up the blanks:

(1) _____ is essential to do work.

(2) Our body gets energy from _____.

(3) Scissors is a simple machine of _____ order.

(4) In a nut cracker power arm is _____ than weight arm.

(5) We use the simple machine _____ to lift water from a well.

(6) The source of heat and light is _____.

(7) In an electric bulb____ energy is converted into____ energy.

(8) _____ is an example for a lever of the third order.

III. Objects are given under list A and their sources of energy are given under list B. Match them correctly.

A	B
(1) Plants	(a) Flowing water
(2) Animals	(b) Moving air
(3) Motor car	(c) Sun
(4) Fan	(d) food
(5) Railway engine	(e) Fuel
(6) Wind wheel	(f) Electricity
(7) Electric generator	(g) Heat
(8) Torch light	(h) Dry cells

15. LIGHT

Nature of Light:–

At the time of sunrise early in the morning you hear the chirping sound of birds. You see the blossoming or just blossomed flowers on plants and trees. Is it not that sunrays falling on the object in the environment that makes us see objects with all their beauty?

You have learnt that light is a form of energy. This world would not have existed if there was no sunlight. Sunlight is the basis for the activity of all living beings.

Sun emits his own light. You have seen the stars twinkling. These stars also emit their own light. We call these 'Self-luminous objects'. In the same way there are some other objects which emit their own light. Make a list of them.

Do it yourself:–1

Keep a mirror slightly inclined in sunlight. Observe that bright light falling on the front wall. In the absence of sun light, when the mirror is kept in a similar way, does the light fall on the wall? Think of the reason.

When the mirror is held in sunlight the reflection of light has fallen on the wall. Here the mirror has not given its own light. It has reflected the light fallen on it. We call such objects non-luminous objects.

Do it yourself:–2

Make a list of self luminous and non-luminous objects known to you.

Luminous objects	Non luminous objects
(1)	(1)
(2)	(2)
(3)	(3)
(4)	(4)
(5)	(5)

The self luminous objects mentioned above are sources of light. Some of these are natural sources. Some others are man-made sources. Man made sources are called artificial sources. Burning candle is an example for artificial sources.

Do it yourself:–3

Classify the sources of light known to you as natural sources and artifical sources.

Natural sources	Artificial sources

Transparent objects, opaque objects and Translucent objects:-

When there is bright sun shine, come out of the house and close the doors. Try to have an inner view of the house. You can have a view only through glass windows. We can not see through the wooden doors or walls.

Do it yourself:–4

Hold a glass plate in front of the eyes. Is the front view visible or not? Instead of the glass plate hold a book or a black slate in front of the eye. Are the objects in front visible?

When a glass plate is held in front of the eye, the front view is clearly visible because light travels through the glass easily. Such objects are **Transparent** objects.

Now can you tell why glass plates are fixed in front of the picture **photo frames ?**

When a book is held infront of the eye, light does not travel through the book. So the sight infront of it is not visible. Such objects are called Opaque objects.

Do it yourself:-5

Write down the transparent and opaque objects you know in the table given below:

Transparent objects	Opaque objects

You might have observed decorative glass used in some hous Are they transparent objects? or Opaque objects? Or belongs to both groups?

Do it yourself:-6

(1) Take out a page from the printed book. Spread a thin cloth over it. Are the letters clearly visible through the cloth?

(2) Take a paper smeared with oil. Hold it infront of the eye. Are the objects infront clearly visible?

The objects are not clearly visible when seen through their cl or paper smeared with oil. What might be the reason for this? Light d not travel through such objects completely They allow only a li amount of light to pass through them. We call these objects **"translucent"** objects. Give some more examples for translucent objec We can not see the rods clearly through the glasses used in windows. Fi out the reason.

Remember:-

(1) Transparent objects allow light to pass through them.

(2) Opaque objects do not allow light to pass through them.

(3) Translucent objects allow light to pass through them partially [incompletely].

(4) Self luminous objects emit their own light.

(5) Non luminous objects do not emit their own light.

EXERCISES

1) What is the difference between transparent objects and opaque objets?

2) Give two examples for transparent objects?

3) Paper smeared with oil is an example for translucent object. What is the reason?

4) You cannot see the front view when your hand is held infront of your eye. Why?

5) What is the purpose of using glass in windows?

6) Why are glass tiles used here and there in the roofs of tiled houses?

7) Metals are not useful in the manufacture of bulbs of electrical lamps. What is the reason?

8) Which are transparent objects in the following:-

(a) stone (b) water (c) air (d) glass

(e) brick (f) thin plastic sheet

9) Fill up the blanks in the following:-

(a) Stone is an example for _____ object.

(b) As glass is _____ so we can see the object infront of it

(c) The object seen through a _____object, is not very clear.

16. SHADOW AND ITS PARTS

We have seen the shadow being formed on the wall or on the ground, when we stand in light. When we are tired due to walking in the noon, we take rest under the shade of a tree. What is the meaning of the word 'shadow?'

Do it yourself:–1

Bring a black board infront of a burning candle. Observe the formation of black shadow on the opposite wall. Observe the shape of the shadow and that of the black board. We know that black board is an opaque object. When it is brought before light, black region of the same shape is formed on the wall. This black region is called "Shadow".

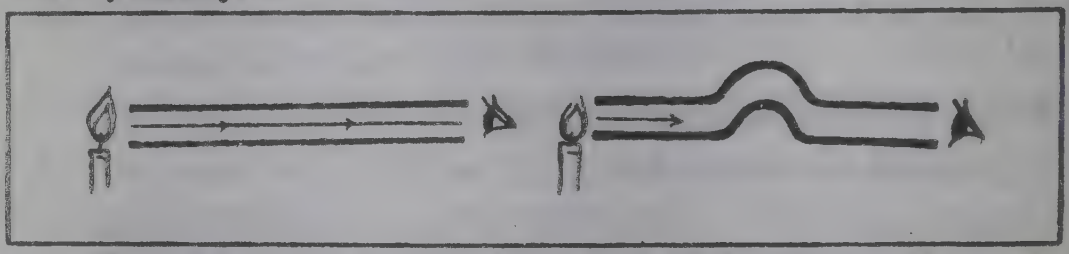
Do it yourself:-2

Hold a thin glass plate infront of a burning candle. Do you see shadow region formed on the wall? Observe.

Glass plate is a transparent object. Light passes through this. So shadow region will not be formed. So can you say how shadow is formed?

There is another reason for the formation of shadow. This concerned with the property of light. Let us try to understand it.

Do it yourself:-3



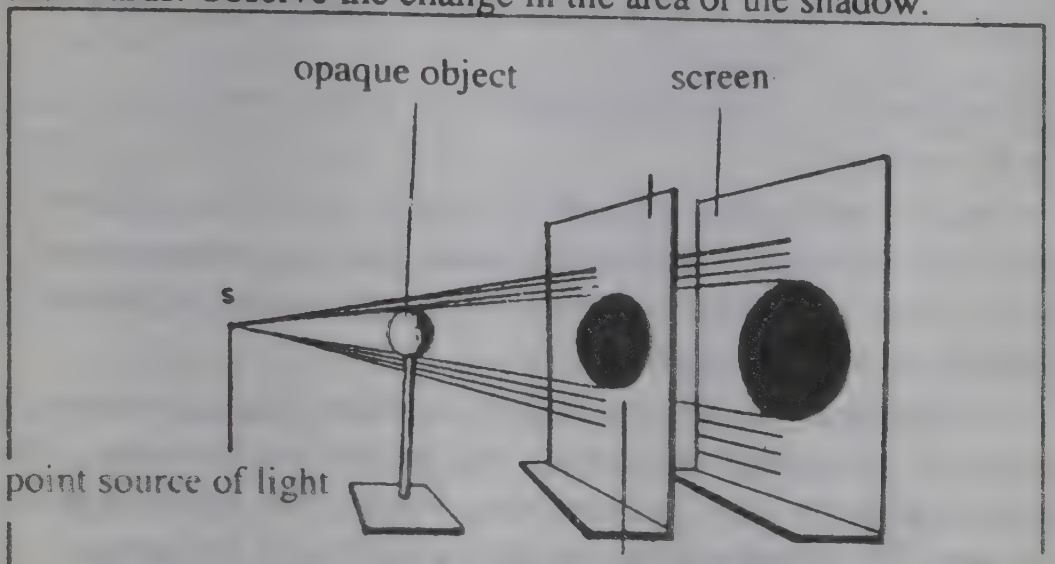
Place a burning candle at one end of the tube as shown in the figure. You can see the flame of the candle through the other end. Instead of this tube use the tube bent in the middle. Try to see the candle. Do you see the flame through the tube?

In the first instance the tube is straight. Light from the flame reaches the eye directly. So the flame is visible.

In the second instance as the tube is bent in the middle, it is not possible for the light to reach the eye. So the flame is not visible. So we can come to the conclusion that light travels in straight lines. Now can you give another reason for the formation of shadow?

Do it yourself:-4

Place globular object (a Ball) in front of a torch bulb Place a screen behind the object, shadow will be formed. Move the screen backwards. Observe the change in the area of the shadow.

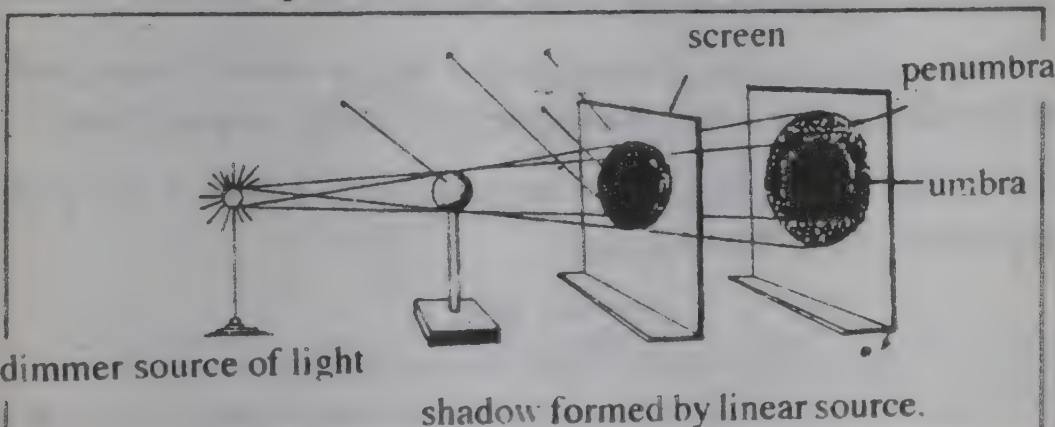


shadow formed by the point source of light

As the screen is moved backwards, the shadow region goes on increasing. But-there will be no change.

Do it yourself:-5

Place a round object infornt of an ordinary elctric bulb instead of torch bulb. Observe the shadow formed on the screen. Observe the parts formed on the shadow. Move the screen backwards. Observe the changes in the area of the parts of the shadow.



shadow formed by linear source.

When an object is placed infront of an extended source of light two regions are found in the shadow. The middle part of the shadow will be very dark. This region is called"Umbra" region. The region around this part will be dim. This region is called "Penumbra" region. As the screen is moved backwards, the areas of both the regions gradually increase.

Do it yourself:-6

Place a small piece of chalk in front of an ordinary electric bulb. Here volume of the object is smaller than that of the source of light. Observe the shadow formed. Move the screen backwards. Observe the changes in the shadow.

Two parts are found in the shadow as before. But as the screen is moved backwards, the umbra region goes on decreasing and penumbra region goes on increasing. Finally the umbra region vanishes. The screen will be completely filled with Penumbra.

The shadow of an aeroplane moving above or the shadow of a flying bird, flying above at a great height is not seen.

Can you guess the reason?

Eclipses:-

Generally at the beginning of the new year our elders study the calender and find out when the eclipses occur.

You might have observed this. Then what might be the meaning of the word "eclipse"

An object in a shadow region will not be visible from a distant place. We say that the object is eclipsed or it is in a eclipse region.

As you already know there are two parts in a shadow: the umbra region and the penumbra region.

Do it yourself:-7

Close the doors of a room completely. See that light does not enter the room. Look around. Can you see the objects? Afterwards open the windows a little. A little amount of light enters in. Now observe the objects around. Are all the objects visible? If not objects in which region are visible? Why are the objects in other regions not invisible?

When an object is in the umbra region it is not at all visible. But if a part of that object is in the penumbra region, that part is visible to some extent. What might be the reason for this?

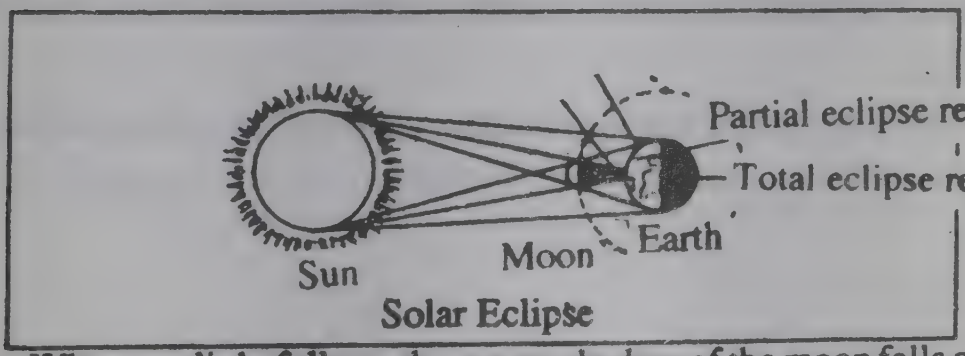
When a part of light slips to this region, penumbra region will be formed at that region. When an object is in the umbra region total eclipse of that object will be formed. If it is in the penumbra region, partial eclipse will be formed.

You know that earth is a planet. It is one of the nine planets found in the solar system. You also know that the earth is moving around the sun. In the same way the moon is moving round the earth.

Earth is made up of stones, mud and such other things. Can light pass through this?

Is earth a transparent object or an opaque object ? Moon is also an object like the earth. Is moon transparent or opaque?

Imagine that moon is in between the sun and the earth in a straight line:

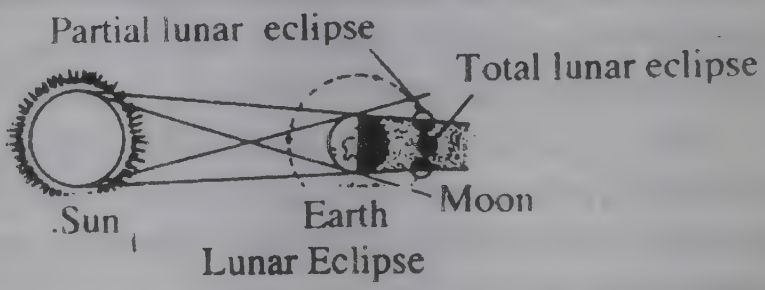


Solar Eclipse

When sun light falls on the moon, shadow of the moon falls on the earth. In the moon's shadow, there is no possibility of the earth being

covered completely. What might be the reason? The shadow falls on a portion of the earth. Can the people in this region see the sun? As the poeple on this part of the earth cannot see the sun, we say that these people are having solar eclipse. What type of solar eclipse will be for the people in the umbra region? People in the penumbra region can not have total solar eclipse. Why?

Solar eclipse occurs only on new moon days. Why? Now let us imagine that earth is in between the sun and the moon in a straight line.



Lunar Eclipse

Now shadow of which object falls on which object? Can the shadow of the earth cover the moon completely? How it is possible?

When the moon is in the earths shadow region it will not be visible to us. So what type of eclipse might have occured?

Imagine the necessary situation for the formation of total lunar eclipse?

When does partial lunar eclipse takes place? When the moon is completely in the umbra region of the earth, total lunar eclipse takes place. If the moon is in the penumbra region, partial lunar eclipse takes place.

Lunar eclipse can take place only on full moon days. Find out the reason with the help of the given figure.

Do it yourself:-8

Fix a stick perpendicular to a piece of soap. Bring a burning candle before it. On which side is the shadow of the stick formed? Observe the length of the stick. Slowly bring up the burning candle. Move it from one side to other. Observe the change in the length of the shadow as and when the candle is placed before the stick. The shadow of the stick falls on the earth to the opposite diection. Its length decreases as the candle goes up. When the candle is just above the stick, length of the shadow will be at the minimum. When it is moved to the otherside the length of the shadow goes on increasing. Using the principle construct a solar-clock and try to findtime.

Do it yourself:-9

Take a thick card board. Cut it into a circular shape. Fix a stick perpendicular to the card board at the centre. Place it in sunlight. Shadow of the stick falls directly on the card board. Mark the end of the shadow. Now mark the time correctly after one hour. Mark the end of the shadow again on the card board. The distance between these two marks indicate an hour time. Having this as basis, mark points at equal distances.

How many divisions can be made on the circumference? Think on whether this can be used as a clock.

This type of clock is called solar-clock. You can see this type of clock in Lalbagh, at Bangalore.

Remember:-

1. **Shadow is formed when an opaque object is placed in front of a source of light.**
2. **Umbra region will be very dark and penumbra region will be dim (partially dark).**
3. **Light travels in straight lines. Due to this eclipse occur.**
4. **Lunar eclipse occurs when the earth comes in between the sun and the moon.**
5. **Solar eclipse occurs when the moon comes in between the sun and the earth.**
6. **Lunar eclipse occurs on full moon days and solar eclipse occurs on new moon days.**

EXERCISES

1. How is shadow caused?
2. Write a diagram showing the shadow caused when ball is placed in front of a burning candle.
3. The shadow of a bird flying at a great height is not seen. Why?
4. Shadow is formed when a wooden board is held infront of a burning candle. But shadow is not formed when a thin plastic sheet is held. Why?
5. What is meant by an umbra region?
6. There is partial darkness in the penumbra region. Why?
7. Which property of light is the cause for the formation of shadow?
8. What is the meaning of the term eclipse.
9. What are the conditions for the formation of umbra region and penumbra region?
10. What is the reason for the formation of eclipse?
11. How does lunar eclipse occur?

12. Write a diagram to show the solar eclipse.
13. Mention the conditions required for the formation of lunar eclipse.
14. Why does solar eclipse occur only on new moon days ?
15. Why does not lunar eclipse occur on all full moon days ?
16. Fill up the blanks:
    (1) _____ region is called umbra region.
    (2) Partial shadow region is also called _____ region.
    (3) Shadow is formed when a _____ object is held in front of a source of light.
    (4) When an object is taken towards the source of light, the size of the shadow _____

17. NATURAL RESOURCES OF THE EARTH

Part – I

There are a number of things around us on this earth. Some are living beings, the others are non-living beings.

We need certain things to live. What are those essential things ? All living beings breathe. Air is needed for breathing. We also need water to drink and food to eat. Where do we get all our requirements from ? Just think over.

Forest, Animals and Birds

Sunlight, water, air, plants, hills, soil, animals (including man) are found on this earth. These are natural things available on earth. We use all these things for one purpose or the other.

We have a number of useful things inside the earth also. Can you name some of these things that are found undergound? For example coal is one such thing found underneath the earth. Coal is used as a fuel. In the same way inside the earth, we have things like petroleum, diamond, graphite and salts and metals like gold, silver and aluminium etc. These are naturally available things.

Such things that are naturally available above or below the earth, are called "Natural Resources" They help in making our life happy and comfortable. Man has to make use of these natural resources very carefully and wisely. How to use these resources wisely ? Think over.

Do it yourself:–

(1) Make a list of articles available in your school. Of what materials are they made of? Identify the natural resources from which these articles are derived ? Prepare a statement in the form given below.

Sl. No.	Articles available in school	Materials used	Related natural resources
(1)	Chair	(1) Wood (2) Screw (3) Nail	(1) Forest (2) Iron (3) Iron
(2)			
(3)			
(4)			

(2) Make a list of the different materials used in the construction of your house. Trace the resources from where these articles are obtained. Make a list as given below.

Sl. No.	Different parts of the building	Materials used	Natural resources
(1)	Country tiled roof	(1) Wood (2) Reapers (3) Beams (4) Tiles (5) Rope	(1) Forest (2) Garden (areca palm) (3) Garden (Coconut) (4) Soil (5) Coconut palm

Things to remember:–

(1) There are a number of natural resources both on the earth & inside it.

(2) Sunlight, air, water, plants, animals, rocks, soil, hills are some of the natural resources found on the earth.

(3) Iron, gold, silver, aluminium and such other metals, coal, graphite, diamond, mica are some of the resources found inside the earth.

(4) We form the part of the animal resources found on this earth.

EXERCISES

Answer the following :

(1) What is meant by natural resources ?

(2) You find below a list of natural resources. Group them into two categories:

(a) Resources found on the earth.

(b) Resources found inside the earth.

Water, air, gold, silver, animals, iron, sunlight, copper, coal, plants, rocks, graphite, sulphur, petroleum, manganese, man, mica.

(3) How many types of natural resources are there ? give one example for each.

18. NATURAL RESOURCES OF THE EARTH
Part -II

The natural resources found on earth can be classified into three groups. Some of the natural resources are inexhaustible. They are present in large quantities. Even if you use for a long time, you cannot exhaust them. Can you name a few such resources ?

We are using sunlight, air and water since ages. They are very essential things. But these resources are still available in plenty. So such natural resources are called "unlimited or inexhaustible natural resources" We use varieties of soil, animal, plant and water resources continuously. Do you think that they will be exhausted after some time ? When certain water or plant resources are exhausted, we try to find out new sources of water. As we use these resources, we develop and find out new sources also. So such resources are available to us at all times. They are called "resources that can be developed or renewed".

But what about resources like coal ? As we go on using it constantly, after a particular length of time, the resources will be exhausted. All fuels belong to this group. Such resources are called "limited resources".

Man uses these varieties of resources in different ways. The resources are inter dependent. Can you tell how it is so ?

Sun-light is very essential for us. The warmth that is necessary, is got from sun-light. This in turn is necessary for rain. Crops depend upon rain. We use sunlight for different purposes.

Sun-light is used by plants for growth and manufacture of food. Plants also use carbon-dioxide present in air and give out oxygen. This is necessary for both plants and animals for breathing. The grains, fruits and other things produced by plants serve as food of animals. Animals provide manure for plants. Insects help plants in pollination. Man uses plants and animals as food. He also grows and protects plants. In this way we see a kind of inter dependence among plants, animals and birds. Even if one

group is not there in nature, the other group can not exist. So it is necessary to maintain a balance in the resources. Role of man in maintaining the balance in resources is very great. By maintaining balance of resources, environmental protection can be achieved.

Do it yourself :–1

Observe carefully the environment around your school. Remember the environment around your house. Compare the things found in these two environments. Discuss with your friends.

Air is necessary for our breathing. Water is used not only for drinking but also for agricultural purposes and for the generation of electricity.

How are plants useful to us ? They give us food, medicine, timber and so on. Cotton is used in the manufacture of cloth, is a plant-product.

Let us remember how animals are useful to us. Animals are useful to us in different ways. They give us skin, wool, food, manure and other things. Animals serve us in different ways.

What do we understand from this? We need several natural resources found on earth. They are necessary for our everyday life. So it is our duty to preserve and protect these resources.

Do it yourself:–2

(1) Make a list of plants around your home, school or elsewhere. How are they useful to you ?

(2) Make a list of food articles that you eat. Classify them into two groups. Plant origin/ Animal origin

(3) Do you have pets at home ? Name them. How are they useful to you ?

We already know petroleum, coal, iron, copper etc are available in mines. Coal is used as fuel. It is useful in other ways also.

When coal is heated in the absence of air we get coke. During this process, a number of other substances like tar and Naphthalene are found

at different stages. From these products D.D.T.[D.D.T. = Dichlor Diphenyl-Trichloro-Ethane], plastic, medicines, paints and many other useful things are made.

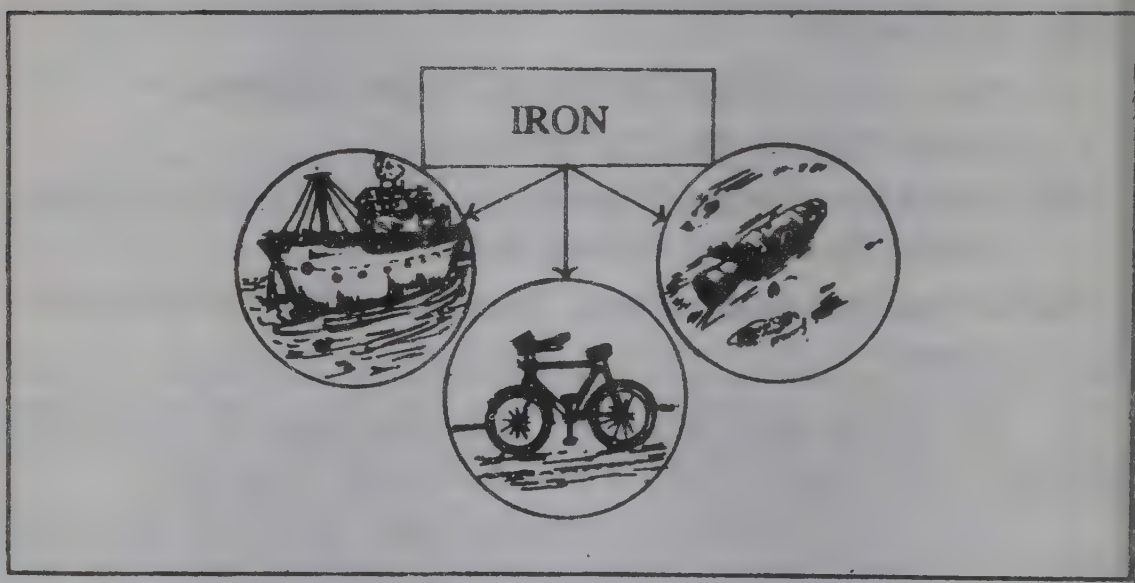
Petrol is used as fuel for cars, scooters and buses. This i purified petroleum oil. Petroleum oil is found in deep underground wells it is pumped out from these wells.

First we get raw petroleum. This can not be directly used to run machines. This is purified. During the purification process, tar, kerosene diesel, wax, petroleum jelly, etc. are obtained. Finally petrol is got. Do you know where and how these products are used? Tar is used in making roads Paraffin wax is used in making candles. You know he use of kerosene oil.

Some minerals are found underground. Iron, manganese etc are found in the form of ores. This is dug out from mines. Steel is obtained from iron. Iron and steel are useful to us in our daily life in many ways. Needles, nails, stainless steel vessels, rods etc. are all made of steel or iron. Make a list of uses of iron and steel.

Rocks are present both on the earth and inside:

(ii) Gold and Minerals of silver, copper, aluminium are found in rocks.



Rocks are used for building purposes. Granite is very strong So it is largely used for construction of buildings. Rocks have different colours. Granite takes high polish. It is exported to many foreign countries. We can know the history of the earth by studying the nature of rocks.

Do it yourself :–3

Make a list of the activities that you were doing for the last 2-3 days like eating food, coming to the school, working in the fields, helping your mother in the kitchen, playing, reading lessons etc. You have used a number of things during these activities. Classify the articles used for each activity as

(1) Things grown on earth

(2) Things found underground

(3) Things obtained from plants and animals.

If there are certain things that do not belong to any of these three groups, make a separate list of such things.

Things to remember :–

(A) There are 3 types of natural resources:
  (1) unlimited resources,
  (2) resources that can be renewed or developed and
  (3) limited resources.

(B) Natural resources are inter-dependent. Human life and progress depends upon the natural resources. We have to use these resources judiciously.

(C) When coal is heated in the absence of air, many useful products are produced. Ex. Naphthalene, tar, medicines etc.

(D) During purification of petroleum also many substances are formed. They are useful in our daily life.

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EXERCISES

Answer the following:-

(1) How many types of natural resources are there ? Give one example for each.

(2) How are natural resources interdependent ? Give examples.

(3) "We have to see that a balance of natural resources is maintained" Why ?

(4) What are the uses of plants ?

(5) How are animals useful to us ?

(6) What would have happened if sunlight was not available to us ?

(7) What are the products formed while getting coke from coal ?

(8) Name the substances obtained while purifying petroleum ?

(9) Below are given two lists. List A consists of certain substances. List B Consists of their uses. Match them correctly.

A	B
(1) Tar	(A) for making candles.
(2) Kerosene	(B) for making stainless steel.
(3) Paraffin wax	(C) for destroying cockroaches.
(4) Naphthalene ball	(D) as fuel.
(5) Iron	(E) for making roads.

19. NATURAL RESOURCES OF THE EARTH

Part – III

Many times we do not use the natural resources directly. We make use of the products made out of them. Ex. food, vegetables, fruits etc obtained from plants; milk, eggs, meat etc obtained from animals. In the same way many things that we use in everyday life are the products obtained from nature.

Do it yourself:–

(1) **Make a list of things that you use from morning till evening. Identify the things obtained from plants and animals. Make a separate list. Find out things obtained from other natural resources (other than plant or animal origin). Identify these resources.**

(2) **Collect five medicinal plants available in your locality. Try to know their names and uses. Which part of these plants are used as medicine. Discuss with your friends.**

Water is one of the natural resources found both on the earth and inside the earth. Sea water is saltish. It is not fit for drinking. But when sea water evaporates and goes up it form cloud. It returns to the earth again in the form of rain. Rain is the chief source of water. There is no water without rain and there is no life without water. The rain water when it falls on earth flows to lower areas and collects in tanks. A part of rain water sinks underground. This underground water is also available to us. When we dig wells, we get water. Thus the rain water which is the chief source is used for many purposes.

During summer the water in the wells and tanks dry up. Water famine may be caused. What may be the reason for this kind of situation?

We use the available water for different purposes namely for drinking, washing clothes and vessels, for agriculture and in industry (Fig.). While using water for these purposes, a lot of water is wasted.

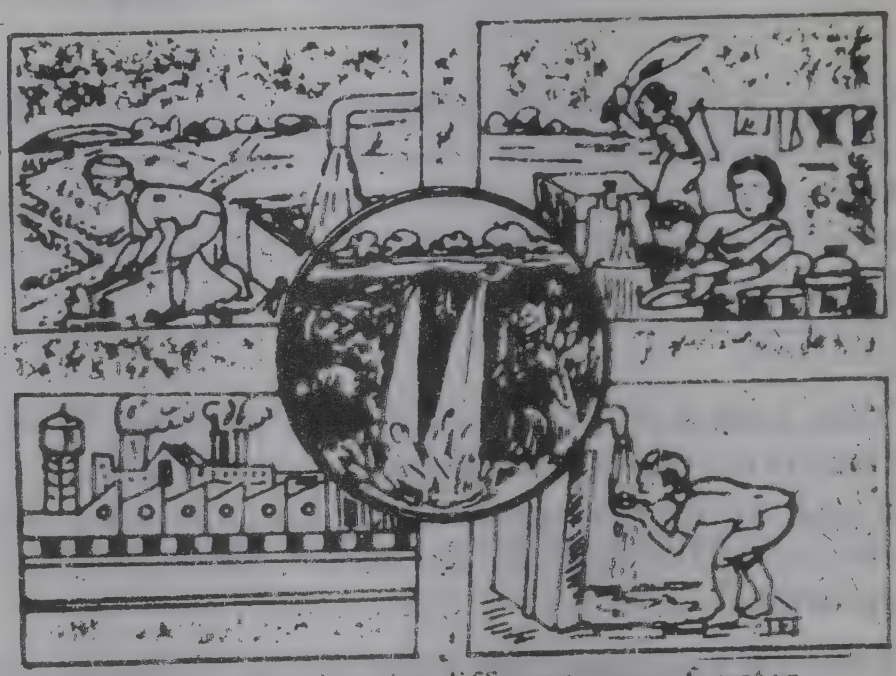


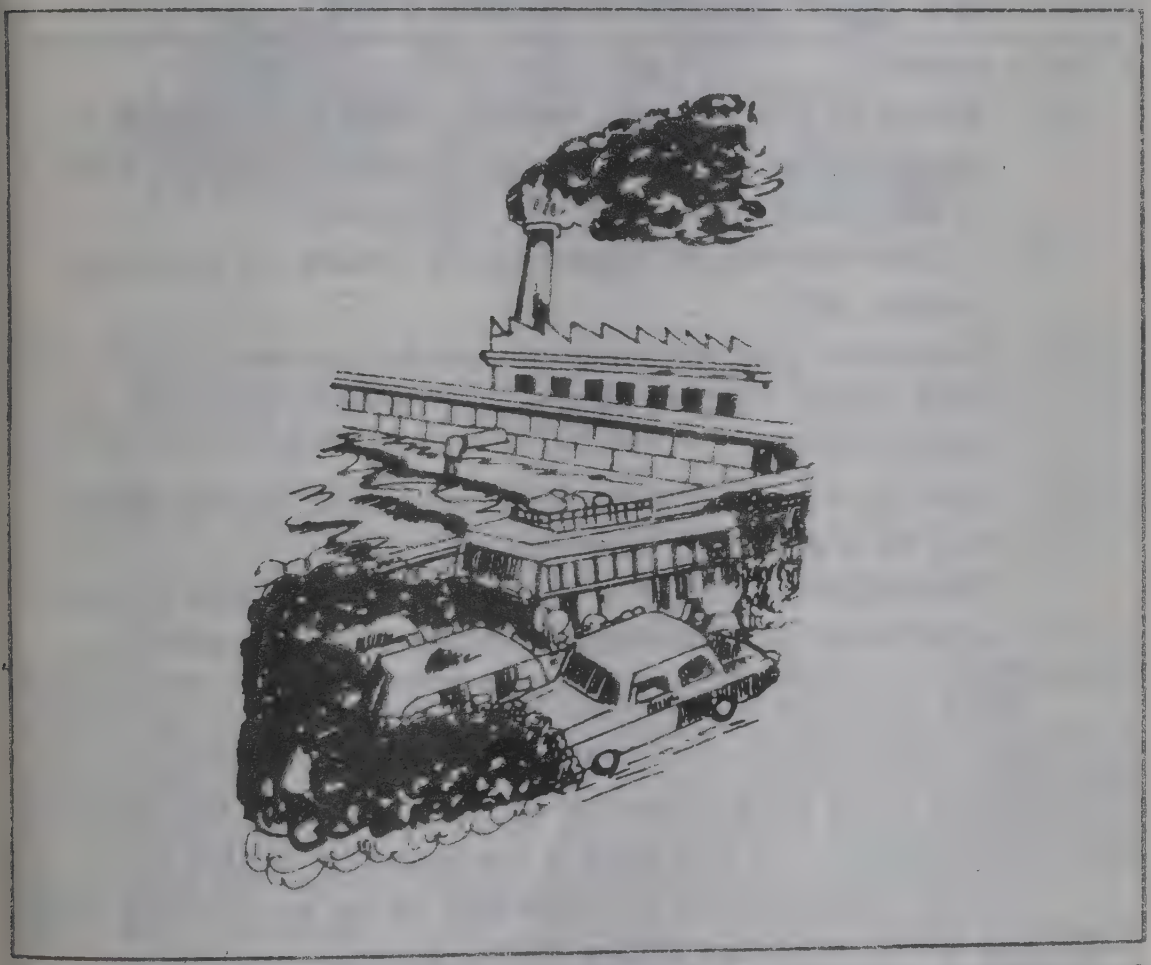
Diagram showing the different uses of water.

Sometimes in towns tap water is also wasted. We have seen water flowing from damaged pipes or leaky taps. We do not take quick action to repair it. This kind of wasting water should be avoided to. Now a days borewells are sunk both for drinking water and for agricultural purposes. There are instances of even borewells going dry. This has resulted in water scarcity. What might be the reason for this ? Sometimes we do not get adequate rainfall due to failure of monsoons. We have to make the best use of river water also. Otherwise it flows into the sea. So we have to plan very well and make the best use of water resources, as water is very essential for life.

Many times the water on earth gets polluted. This is called water pollution. There are many reasons for this. Stagnant water gets polluted quickly. If the drainage system in a town or city is not good, the water that we use do not flow properly. This results in pollution. Sometimes waste products of a factory are let out to the nearby river or sea. The waste and drainage water is also let out sometimes to rivers. All these cause water pollution. The vegetables, fruits and food produced using this kind of water

will have a very bad effect on health. The use of such polluted water causes many diseases.

To prevent such things, care should be taken to prevent pollution of water. Lime, bleaching powder and such other disinfectants should be used where ever necessary. Drinking water should be purified before they are supplied to houses. Proper drains should be constructed to see that water flows easily. Wherever possible underground drainage system helps in preventing water pollution. Industrial concerns (Factories) should be properly instructed not to let waste water into rivers or sea. In spite of all precautions, natural water gets polluted. In such cases it is desirable to boil and filter water before use.



Pollution of natural resources include air pollution also. We need pure air for breathing. When impurities get mixed up with atmospheric

air, it gets polluted. Poisonous gases like carbon monoxide which comes out of the factories enter air. Lorries, buses, cars and other vehicles emit smoke which is very dangerous. When these gases get mixed up with air, it will be polluted.

To control air pollution, we have taken up a number of measures. Indiscriminate cutting of trees should be stopped. Plants absorb carbon-dioxide and release oxygen. Social forestry scheme is one of the projects undertaken to check pollution. Use of filters for checking smoke from vehicles, using tall chimneys in factories are some of the controls to be exercised to prevent air pollution. Trees should be planted on either side of roads, in the school play ground and in vacant lands. If proper precaution is not taken now, we may have to carry oxygen cylinders with us every day !

Do it yourself :

(1) Where do you get your drinking water from ? What are the arrangements made for the supply of drinking water in your village or town ?

(2) Collect information regarding the source of tap water, timings, etc.

(3) Sometimes you get water in your house taps only for a short period, but not through out the day. Ascertain the reasons for this.

(4) Visit the source of water with your friend in your place- may be a well, tank, reservoir etc.

(5) Sometimes the people of your village might have stopped using water of a particular well. Fond out reasons for this.

Some resources are limited. They are likely to be exhausted in the near future. We use lot of coal and petroleum products every day. When people using these resources increase, naturally the resources get exhausted early. Can you name a few resources of this type ?

Certain resources can be developed, as we go on using them. Plants and animal resources belong to this group.

We are destroying our forests. Trees are cut for selfish purposes. This is very bad. Cutting trees is an offence. Sometimes forest lands are

used for agricultural purposes. Destruction of forest is one of the causes for poor rainfall. It also results in air pollution. In addition to this animals living in forests also die. This upsets the balance in nature. So we have to take precautions to avoid this.

We can grow new trees in place of the trees cut. But we do not do it. By replacing the trees, it is possible to maintain the forest wealth. We must plan planting of trees regularly. We celebrate "vana mahothsava". The objective of this programme is to create awareness among children about planting and protecting plant resources.

In the same way proper precaution has to be taken to preserve animals also. We rear some animals that are helpful to us. But wild animals like tiger and elephants are killed in order to get their skin, ivory or other precious things. As a result of such selfish acts, certain wild life become extinct. This will also upset the balance in nature. Government has banned killing of wild animals. Preservation of wild life is very important. Certain species of animals are very rare. So proper precautions should be taken to protect and preserve animals.

Whatever may be the natural resources, we must use it wisely. We should see that it is not exhausted. Where ever possible we must try to

replace it and develop it. By protecting wild life we have to maintain a balance of natural resources.

Things to remember :–

(1) Coal, petroleum and such other natural resources are limited. If used continuously, they will be exhausted.

(2) Plant and animal resources can be replaced, developed as and when they are used.

(3) Cutting trees in forests affect rainfall and creates imbalance in nature.

(4) Different ways of air and water pollution - measures to prevent it.

(5) There is need to preserve wild life and forests.

EXERCISES

(1) How are animals, birds and plants useful to man?

(2) Name the food products that we get from animals and birds ?

(3) What are the different uses ot water ?

(4) What are the reasons for the pollution of water ?

(5) How is polluted water purified ?

(6) What are the measures to be undertaken to prevent pollution o water ?

(7) What are the reasons for air pollution ?

(8) What are the steps to be taken to control air pollution ?

(9) What are the effects of destruction of forests ?

(10) How can the destruction of forests be prevented ?

(11) What is meant by protection of environment ? What are th advantages?

(12) What happens when the balance in nature is upset ?

ಮೂಲಭೂತ ಕರ್ತವ್ಯಗಳು

ಮೂಲಭೂತ ಕರ್ತವ್ಯಗಳು - ಪ್ರತಿಯೊಬ್ಬ ನಾಗರೀಕನಿಗೂ

(ಕ) ಸಂವಿಧಾನವನ್ನು ಅನುವರ್ತಿಸುವುದು ಹಾಗೂ ಅದರ ಆದರ್ಶಗಳನ್ನು ಮತ್ತು ಸಂಸ್ಥೆಗಳನ್ನು, ರಾಷ್ಟ್ರಧ್ವಜ ಹಾಗೂ ರಾಷ್ಟ್ರಗೀತೆಯನ್ನೂ ಗೌರವಿಸುವುದು ;

(ಖ) ನಮ್ಮ ರಾಷ್ಟ್ರೀಯ ಸ್ವಾತಂತ್ರ್ಯ ಸಂಗ್ರಾಮಕ್ಕೆ ಸ್ಫೂರ್ತಿದಾಯಕವಾ ಉದಾತ್ತ ಆದರ್ಶಗಳನ್ನು ಪೋಷಿಸುವುದು ಮತ್ತು ಅನುಸರಿಸುವುದು ;

(ಗ) ಭಾರತದ ಸಾರ್ವಭೌಮತ್ವವನ್ನು, ಐಕ್ಯತೆಯನ್ನು ಮತ್ತು ಅಖಂಡತೆಯನ್ನು ಎತ್ತಿ ಹಿಡಿಯುವುದು ಹಾಗೂ ಸಂರಕ್ಷಿಸುವುದು ;

(ಘ) ದೇಶವನ್ನು ರಕ್ಷಿಸಲು ಮತ್ತು ರಾಷ್ಟ್ರಕ್ಕೆ ಸೇವೆ ಸಲ್ಲಿಸಲು ಕರೆ ಬಂದಾಗ, ಹಾಗೆ ಮಾಡುವುದು ;

(ಙ) ಧಾರ್ಮಿಕ ಭಾಷಾ ಮತ್ತು ಪ್ರಾದೇಶಿಕ ಅಥವಾ ಜಾತಿ ಪಂಗಡಗಳ ಭಿನ್ನತೆಗಳಿಂದ ಅತೀತವಾಗಿ, ಭಾರತದ ಎಲ್ಲಾ ಜನತೆಯಲ್ಲಿ ಸಾಮರಸ್ಯವನ್ನು ಮತ್ತು ಸಮಾನ ಭ್ರಾತೃತ್ವದ ಭಾವನೆಯನ್ನು ಬೆಳೆಸುವುದು, ಸ್ತ್ರೀಯರ ಗೌರವಕ್ಕೆ ಕುಂದುಂಟು ಮಾಡುವ ಅಚರಣೆಗಳನ್ನು ಬಿಟ್ಟು ಬಿಡುವುದು ;

(ಚ) ನಮ್ಮ ಸಮ್ಮಿಶ್ರ ಸಾಂಸ್ಕೃತಿಯ ಭವ್ಯ ಪರಂಪರೆಯನ್ನು ಗೌರವಿಸುವುದು ಹಾಗೂ ಕಾಪಾಡುವುದು ;

(ಛ) ಅರಣ್ಯಗಳು, ಸರೋವರಗಳು, ನದಿಗಳು ಮತ್ತು ವನ್ಯಜೀವಿಗಳೂ ಸೇರಿದಂತೆ ನೈಸರ್ಗಿಕ ಪರಿಸರವನ್ನು ಸಂರಕ್ಷಿಸುವುದು ಹಾಗೂ ಮೇಲ್ಪಟ್ಟಿ ಮಾಡುವುದು, ಪ್ರಾಣಿಗಳಿಗೆ ಅನುಕಂಪ ತೋರಿಸುವುದು ;

(ಜ) ವೈಜ್ಞಾನಿಕ ಮನೋಭಾವನೆ, ಮಾನವೀಯತೆ, ಜಿಜ್ಞಾಸೆ ಮತ್ತು ಸುಧಾರಣಾ ಪ್ರವೃತ್ತಿಯನ್ನು ಅಭಿವೃದ್ಧಿಗೊಳಿಸುವುದು ;

(ಝ) ಸಾರ್ವಜನಿಕ ಸ್ವತ್ತನ್ನು ರಕ್ಷಿಸುವುದು ಮತ್ತು ಹಿಂಸೆಯನ್ನು ತ್ಯಜಿಸುವುದು ;

(ಞ) ರಾಷ್ಟ್ರವು ನಿರಂತರವಾಗಿ ಸಾಧನೆ ಮತ್ತು ಸಿದ್ಧಿಯ ಉನ್ನತ ಮಟ್ಟಗಳಿಗೆ ಬರುವುದಕ್ಕಾಗಿ ವೈಯಕ್ತಿಕ ಹಾಗೂ ಸಾಮಾಜಿಕ ಚಟುವಟಿಕೆಯ ಎಲ್ಲಾ ಕಾರ್ಯಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಶ್ರೇಷ್ಠವಾಗಿ ಶ್ರಮಿಸುವುದು :-

(ಕರ್ತವ್ಯವಾಗಿರತಕ್ಕುದು)

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